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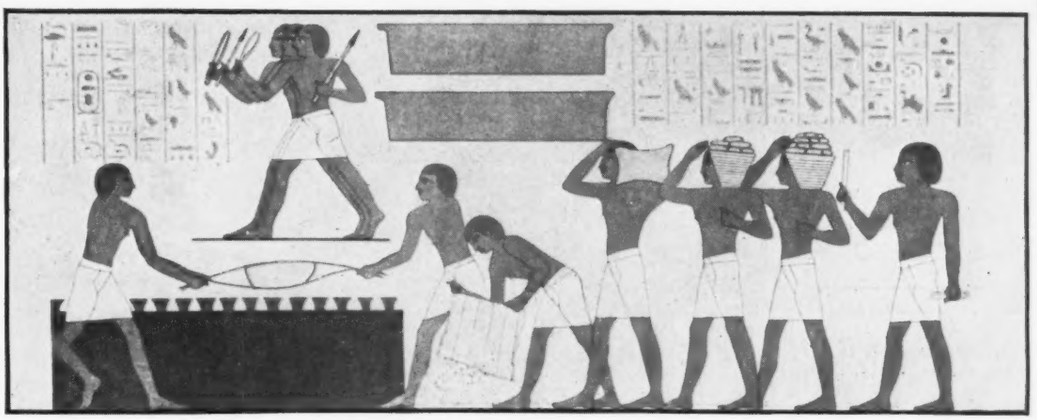

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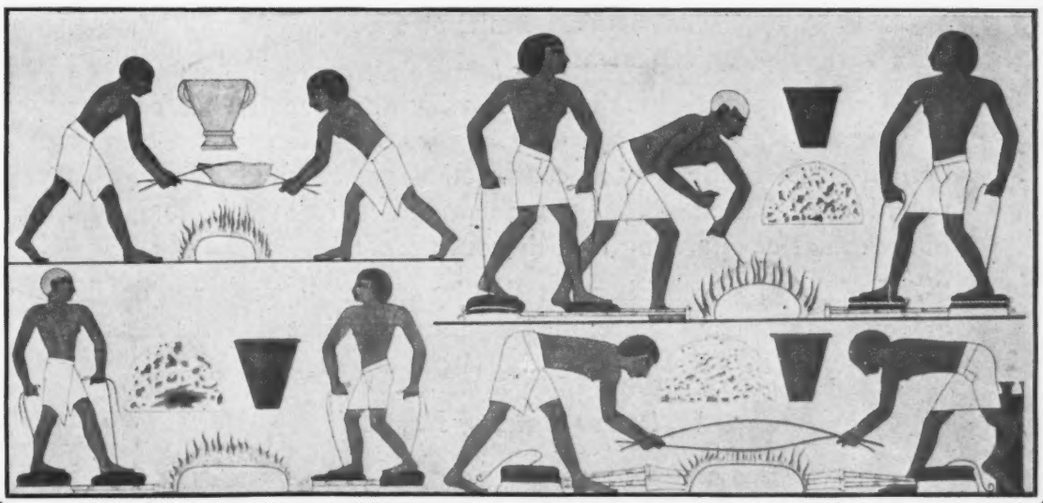
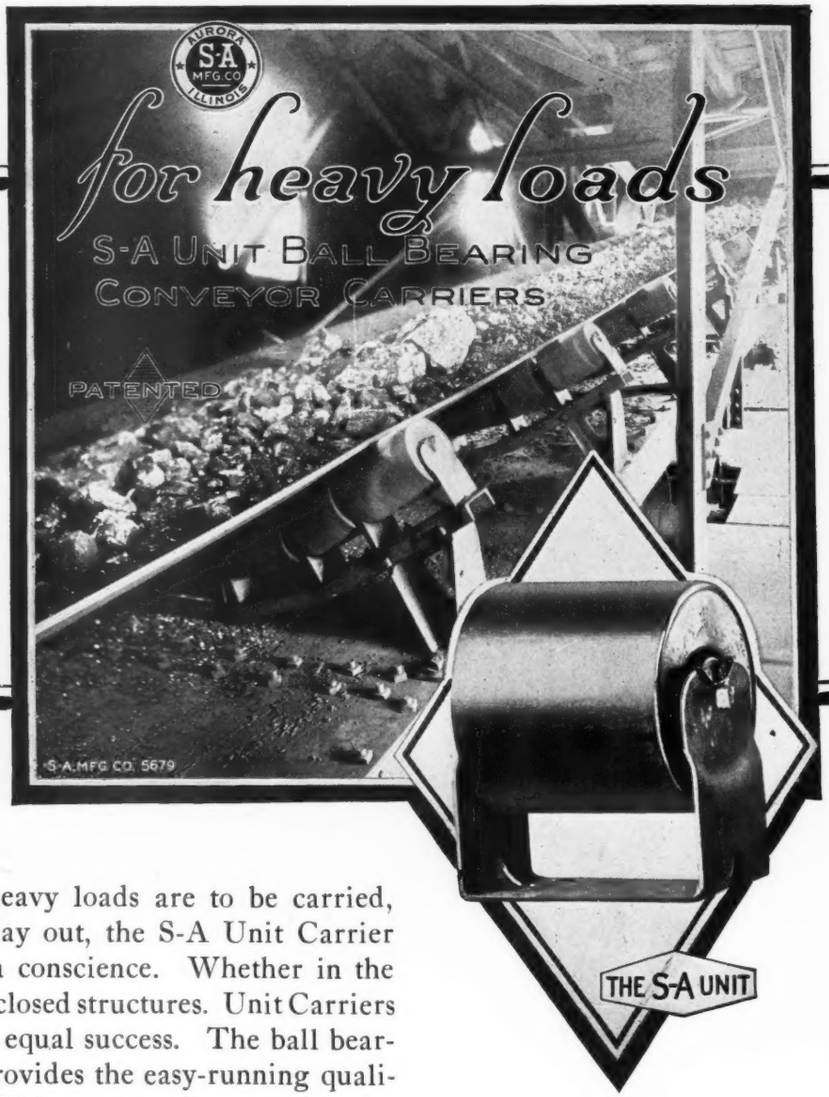


A WEEKLY JOURNAL REPRESENTING THE WORLD'S MINING AND METAL INDUSTRIES

September 2, 1922



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Does Mining Require More Skill Than Shoveling?

THE TWO MOST important classes of workers in a mine are the machine men and the shovelers, or "muckers," as they are popularly known. In the large majority of American mining camps the machine men are paid a higher wage than the shovelers. One important exception exists—in Montana—where the rate paid both is identical. The companies adopting the uniform rate have not done so without serious deliberation, but are convinced that their decision is wise and that sufficient justification can be shown for it. So far as we know they encounter little if any objection from the miners—naturally not from the shovelers.

It would be interesting to know whether other mining districts have ever tried this system, only to revert to differential schedules. To the observer it would appear that quite a distinction exists between the work of miners and shovelers, a distinction at least pronounced enough to require a greater pecuniary reward to miners than to shovelers. It obviously requires more skill to run a drill than to wield a shovel. Pointing the holes skilfully, adjusting the machine properly, and the other duties of a machine man cannot be efficiently performed by a man only used to a spade. The advocates of an equal wage scale are willing to admit this, but they also insist upon the fact that a good portion of the miner's time is spent at shoveling and that the shoveler is often called upon to help the driller. They maintain that there is so little difference between the two classes of work that a uniform wage for both is advisable.

Camps in Arizona, Idaho, Colorado, and other mining states, however, recognize this difference in their rates of compensation. An interesting question to consider is whether the wage of a shoveler is the deciding factor in determining the uniform scale or the wage of the machine man. Frequently there is a shortage of either miners or shovelers, a condition favorable to the paying of a bonus to one class. A uniform wage would necessitate raising both rates simultaneously.

We wonder whether the miner has lost and the shoveler gained by the new arrangement, or whether the shoveler has merely increased his compensation. It would seem that the higher skill of the miner, his greater subjection to the discomforts of mining—the risk of pulmonary trouble for example—would entitle him to a little greater consideration. It has always been that a measure of skill above the average, no matter whether entirely physical or not, commands a commensurate return. Does the fact that shoveling requires a strong back and is harder work than drilling offset its much simpler character?

Mining camps that still maintain a differential scale have excellent reasons for doing so, but they should watch the results of using the flat rate. They may be paying too much to the miners or too little to the shovelers.

Gold Mining in the Porcupine District of Ontario

NORTHERN ONTARIO not only contains remarkably rich and extensive gold deposits, but the districts in which they lie are surprisingly close to the largest cities of the continent. The Porcupine district is less than 600 miles north, and less than 400 miles west, of New York—about 700 miles in a direct line. Any one longing for the white lights of Broadway can put in Friday morning at the Hollinger mine, leave Timmins right after lunch and be safely tucked away in a New York hotel at a decent hour Saturday night—if he wants to. This accessibility has no doubt had an important influence in aiding the development of that part of the province.

Porcupine, as one of our editors saw it a few weeks ago, is not a particularly attractive part of the world—few mining districts are. Two bad forest fires in which a large number of people were killed and an enormous amount of property was destroyed have ruined all that was attractive about the vegetation. Scrubby bush and small stunted trees now cover most of the burned area. Small lakes are fairly numerous, and the country is somewhat undulating. The town of Porcupine is now of no importance and largely deserted. The first discovery was made near there in 1909, but the profitable area has so far been several miles to the west in the vicinity of Timmins and the smaller adjoining town of Schumacher. Timmins has a few substantial stores, but most of the construction is pretty rough. The Goldfields Hotel proved better than expected, the room being clean and the table good, at $4 a day; visitors are warned to reserve their rooms in advance. A golf course has been laid out and a clubhouse built.

The Hollinger is the largest and richest of the three successful mines in the Porcupine district. The property embraces 400 acres. The rocks are schistose basalt and dacite intruded by wedge-shaped masses of quartz porphyry, and close to 200 veins have been delineated. The deepest level is now about 1,500 ft., though the 600 and 800 are the principal working levels at present. From the work that has been done, it is estimated that the mine will ultimately yield $150,000 for each foot of depth below the surface, the ore running about $8 per ton as milled. Somewhat more than 4,000 tons of ore a day is now being milled; it is said that this will be raised to about 7,000 tons within a year or two in all probability, which will make the Hollinger the greatest of the world's gold mines in production, though the Homestake will probably surpass it in capacity, with the 4,000-ton addition, now practically completed. Coarse crushing is performed in gyratories and rolls, and fine crushing in ball and tube mills and stamps, after which the pulp is subjected to both cyanidation and concentration. An important test is now being carried on in which the virtues of stamps, ball, and rod mills will be

compared; when completed, we hope to have the privilege of publishing the results. It is likely that the stamps will be displaced in favor of one of the other types at no distant date.

At the neighboring property of the McIntyre-Porcupine company, welcome was tendered by Mr. Ennis, and by Mr. Dorfman, the metallurgist. A new 250-ton unit which will increase the capacity of the mill by 50 per cent was just being put into operation for the treatment of carbonaceous ore which had caused premature precipitation of the gold in the regular mill flow sheet. The trouble is being overcome by the use of oil before cyanidation, to coat the graphitic particles. When details are worked out the report of the work done should make interesting reading. Another interesting thing which Mr. Dorfman has developed in collaboration with some of the engineers of the Dorr company is the use of tray tanks for counter-current decantation. The making of a proper joint between the trays offered difficulties, but these have been solved, and as a result of this work it will no longer be necessary to have the multiplicity of tanks which have heretofore been considered essential in even a small installation of the cyanide process. Mr. Dorfman has promised us an article on this development soon.

The property of the Dome Mines lies three miles southeast of the Hollinger and McIntyre mines. An elaborate mine model has been prepared which illustrates plainly the plum-pudding nature of the deposit. Just now the ore being milled is of much higher grade than formerly, being even better than that of the Hollinger. Of course it is problematical how long this grade of ore will persist. About 1,000 tons per day is being treated.

The Vipond (now the Porcupine V. N. T.) and the Porcupine Crown (now the Northcrown Porcupine) operated for a time and the latter paid dividends for three years.

Low-grade cyanide, which has of late become so widely used on this continent, is not yet acceptable to the metallurgists of the Porcupine and Kirkland Lake districts, though it is in use at Cobalt. The quantities used in gold mills are so meager that the smaller mills do not consider it worth while to experiment, and so stick to the high-grade article manufactured by the Cassell company in Scotland. One of the mills at Porcupine has done some experimenting with low-grade cyanide, but found that for some reason there was a coincident increase in the pressure in the filters. Further tests, it is understood, are to be made.

Though the Hollinger, McIntyre, and Dome are the only mines in the Porcupine district which have had ore of sufficient tonnage and grade to warrant their continued operation to the present, there is every likelihood that other valuable properties will be found. Much of the area to the east has hardly been touched beneath the surface, and further work, especially diamond drilling, will no doubt disclose other orebodies of importance. For such development, capital is, of course, the thing that is needed most. Of the prospects, the Porcupine Paymaster is said to be one of the most attractive; this is situated south of the Dome.

Of the operating mines, there is little doubt that more gold remains underground than has been taken out, which in itself totals about $75,000,000. Considering, too, the possibilities of the prospects, it is evident that the district is in its infancy.

Metallurgical Purity and Industrial Efficiency

THE REFINING of metals has reached such a stage of physical perfection that the ideal of metallurgical purity may sometimes mask the requirements of industrial efficiency. Thus we learn that the new Episcopal cathedral now being built in Washington was roofed with sheet lead, but that after only a short time it became evident that the particular class of metal used was unsuited for the purpose. Sagging occurred, the pitch of the roof being steep; the nail holes enlarged to such an extent that an immediate investigation became necessary. Metallurgists were called in, who found that the metal used was 99.9 per cent pure, and much too soft for the purpose. Antimonial lead was recommended as a substitute.

Surprise has often been expressed, by visitors to Europe, at the amazing longevity of the lead that was used during the Middle Ages in the construction of cathedrals. The present writer, when once in England in that fourteenth-century architectural masterpiece, the church of St. Mary Redcliffe, in Bristol, noted that the metal inscriptions in the flagstones that floored the nave stood up in ridges, whereas the stone itself was worn in pockets around them. Despite many centuries of traffic, accentuated during most of the time by the fact that the only seats in the church were stone benches at the sides (hence the saying, "the weak to the wall"), the metal, evidently lead, remained apparently unworn. An inquiry elicited the information that the letters were cast in the stone before the metal worker had attained proficiency in the separation of silver from lead; they were composed of a hard alloy that was evidently much superior to refined lead—an alloy that, as far as durability was concerned, was cheap at almost any price.

Buying Something Made of Copper in Houghton

NO ONE CAN PROCEED very far down the main street of Houghton, Mich., without having his attention called to the fact that he is in "the copper country." To be sure, the automobilist who believes in signs may get the idea that that part of Michigan is the home of clover rather than copper, but it is the metal, rather than the plant, that has brought to the Keweenaw peninsula its chief renown.

Strolling down Sheldon St. the traveler is constantly admonished by signs and displays in the store windows to take home a souvenir of the district—something made of the copper which was being extracted from mines a mile deep in the surrounding hills. Or, if his taste is not at all utilitarian, he may procure a lustrous sample of the mass copper properly pickled in a liquid to keep it bright. One store window was completely filled with a large variety of these copper and bronze pieces. Such a traveler—and, indeed, one of the editors of the *Journal-Press*—recently entered such a store, with the thought that here was the opportunity to do something in a modest way, for the district, for the industry, and for his wife. He selected what he thought was the most artistic of the small vases, of chaste design, and possibly ten or twelve inches high. The price was $2.25; though high, that did not frighten him particularly, for he is almost beginning to believe that cop-

per articles are frightfully expensive to make. But on turning the vase over, what did he see on the bottom but the legend "quadruple plated"! Ye gods! Copper a precious metal in the class with silver and gold? "Why," he asked the attendant storekeeper, "do they go to the expense of plating copper four times when they might so easily make the thing out of solid copper?" "Oh, it would be much more expensive if made out of solid copper," he replied; "they save money by using a cheap metal for the inner part, and the finished product looks just as well and is just as durable, for the purposes for which a vase is used, as if made of solid copper." The alert mind of our editor perceived instantly the futility of further reasoning.

Needless to say, he decided then and there that the beautiful Jacqueminot rosebuds in his back yard should never be profaned by putting them in a copper-plated vase.

Later, he mentioned the incident to the manager of one of the mines. "Yes, the stores sell a lot of that stuff," he said. The tourists, many of them, are led to think the copper comes right down out of the Quincy mine, but most of it, I believe, is manufactured in the East, though quite a lot has been coming from Japan lately.

At that, it may be Michigan copper.

Colloidal and Non-Colloidal Clay

THERE IS NOTHING NEW about the colloidal state, although it is often acclaimed as a sequel to some new invention. A consular report, in discussing the china-clay industry in the west of England, states that "colloidal clay, produced by means of chemical processes from china clay, is a highly refined and purified material which commands a much higher price than does ordinary china clay. Colloidal-clay production is as yet in its infancy, but, it is said, its production on a large scale will open up bigger demands for china clay." To which we would comment that the "infancy" has been a protracted one, probably of several million years' duration. The decomposition of granite into china clay, part or all of which may be colloidal, is no new process. The details of Nature's *modus operandi*, although doubtless a chemical one, are unknown. Suffice it to say that weathering plays an important part, although Rohland has suggested that the change might be due to the intervention of micro-organisms. It has yet to be demonstrated that colloidal clay can be manufactured on an economic scale by chemical means. Experiments have demonstrated that simple comminution is not sufficient. A comparison of results has shown that whereas 3 to 4 cu.ft. of "body" could be obtained from a raw clay, the same weight of weathered product gave 6 cu.ft., although in both cases the size of the individual particles comprising the mass was the same. Plasticity is synonymous with colloidity; hence the need for a weathered product in the ceramic industry.

Clays of all types are found associated with other metalliferous minerals, but plasticity or colloidity is usually detrimental to efficient ore dressing. In a few instances the colloidal envelope may be destroyed by roasting prior to the application of hydrometallurgical methods. However, wet crushing of the raw ore is usually essential, whereupon the clay problem becomes insistent.

Flocculation is necessary after classification, as in the ceramic industry, and this is where a chemical is needed. Lime is used extensively, as it is also in connection with the treatment of clay soils, whereby a reduction in the number of particle masses is insured by agglomeration. Thought and research devoted to the theory of the flocculation of clay by lime or other electrolyte may serve to solve the problem of settling and classifying an ore that, mechanically, is difficult to treat.

What is the action of lime on colloidal clay? It may be suggested that the particles in the suspended state are electrified and so repel each other. A dissociation occurs when the lime is added, the metallic ion of the electrolyte being adsorbed by the clay. This has been proved to occur. Further, the adsorption of the ion is probably accompanied by electrical action; for it has been demonstrated that whereas particles of colloidal ferric hydroxide are charged positively in an aqueous solution, the electrical condition is changed by the addition of ferric chloride, whereby hydroxyl ions are adsorbed. Therefore it may be assumed, when lime is added to colloidal clay in suspension, that an adsorption occurs which is accompanied by change of sign, leading to electrical neutralization and settlement of the particles. However, any explanation such as this must be considered as tentative only.

In the preparation of high-grade clay it is often necessary to treat the pulp with a chemical in order to peptize it, *i.e.*, to disseminate the particles and to permit an efficient separation of high-grade colloidal clay from crystalline matter. Thus it is to be noted that although the raw material is treated chemically at various stages of preparation, the reagents are not and cannot be used for the purpose of producing colloidal clay from a non-colloidal earth.

The methods for the classification, thickening, and dewatering of clay pulp are familiar to all hydrometallurgical engineers. An electrical method of separating colloidal clay from crystalline matter is a comparatively recent innovation. In this the pulp is electrolyzed. A revolving cylinder forms the anode; a wire screen alongside, the cathode. The pulp, under the influence of the current, is classified, the colloidal clay going to the revolving anode, where it is deposited. The cylinder dips into the pulp for only a portion of its circumference, so that the removal of the deposited clay is practicable when it becomes exposed to the air. The capacity of the machine, of course, is small. A drum 60 cm. diameter by 150 cm. long gives a deposit of clay varying from 6 to 12 mm. thick, containing 25 per cent water.

There is much scope for research in the electrical or physico-chemical treatment of clay. Problems are continually cropping up for solution in the metallurgical, mineral, ceramic, agricultural and petroleum industries. Latterly, clay has been found to serve efficiently as a decolorizer for oil, although it is probable that the material used approximates fuller's earth in composition.

It is known that lime acts as a coagulant of clay in suspension, but there are no convincing data to show how it acts. If such were available it is probable that further uses for clay would arise as a result of an appreciation of the reasons for its behavior in the presence of the electric current and toward certain chemical reagents. If the function of electrolytes were understood better, it is probable that clay would assume greater importance as an adsorptive and absorptive material. In the hydrometallurgy of base and precious

metals it would be pertinent to determine with precision how these abstractive properties of decomposed kaolin could be neutralized; for it is evident that much loss of dissolved metal is liable to occur in a clayey residue, especially after a replacement treatment of too limited a time to permit the efficient dialysis of valuable solution through the colloidal envelope and into the surrounding wash water.

THE JOURNAL-PRESS STAFF

ARTHUR BARRETTE PARSONS

THE FIRST honest-to-goodness, ten-hours-a-day, thirty-days-a-month, work-or-starve job ever held by the central figure in this sketch was in Ely, Nev., the town made famous in the mining world by the

ARTHUR BARRETTE PARSONS

operations of the Nevada Consolidated Copper Co. This was in 1905, when he was seventeen years old. He confesses, however, that his work had to do with irrigating, cutting, and baling alfalfa hay on the flat in Steptoe Valley rather than with digging in the copper-bearing porphyry at the Ruth and Copper Flat mines up Robinson Canyon. Active development work at the mines was in progress, nevertheless, and surveys were being made for the proposed railroad to connect with the Union Pacific at Cobre.

J. Parke Channing, F. W. Bradley, John H. Mackenzie, Andrew C. Lawson, Henry Krumb and other engineers and geologists had been in the district, and one feature of their activities made a deep impression on the mind of the youthful cultivator of alfalfa. Whereas everybody else traveled by stage or on horseback, the mining engineers invariably moved from place to place by automobile. Without exception they were of sufficient moment in the world to warrant the expenditure for the use of a motor car. Just how much influence the circumstance may have had on our biographee we are unable to ascertain; the fact remains, however, that in September he drew the small balance which remained to his credit on his employer's books, as the result of three and a half months of hard work at "$40 per and found" and, returning to his parents' home in Salt Lake City, entered the Utah School of Mines with the avowed intention of becoming a mining engineer, thereby spoiling, he declares, what might possibly have been a good farmer.

Parsons was born at Salt Lake City, Utah, in 1887. He was educated at the local high school and at the University of Utah. Even as a student at school and college he disclosed a marked journalistic aptitude, for he was manager of a school paper and associate editor and editor of college publications, in addition to doing reporting for the *Salt Lake Tribune*, even before his graduation from the university, though he spent his vacations in the mines and mills of Utah and Nevada. In 1910 and 1911 Parsons worked as assayer, millman and surveyor in Idaho and Nevada, acting as correspondent for *Engineering and Mining Journal* for the last named state, and contributing an article to the paper on "Cyaniding Concentrate at Goldfield." He spent, also, three months in the Utah Copper mill, at Garfield, an experience which nine out of ten young mining engineers seem to have had. From the end of 1911 to 1915 Parsons was mill superintendent for the only profitable gold-mining enterprise in North Carolina, the Iola mine, at Candor. While there he acquired a 420-acre farm, and in his spare time raised peanuts, cotton, and corn. He worked the mine out, however, and left both farm and mine for further professional experience in some of the old-time Western mining camps.

In 1917 Parsons went to India for the Burma Corporation. Concerning this experience, he holds that "If you want to appreciate the United States, spend a year somewhere else." On his return from India in 1918 Parsons was engaged as efficiency engineer by Butte & Superior, at Butte, remaining with that company until he accepted a place as Associate Editor on *Mining and Scientific Press*. For more than a year Parsons was the only editor on the *Press* except Mr. Rickard, and for two weeks or so, during the latter's temporary illness, he enjoyed the unique distinction of being the entire editorial staff (in operating condition) of an international mining journal. Parsons' work on the *Press*, in addition to his routine editorial duties, comprised in part twenty special articles, which included a series on "Nevada Consolidated," on the "Engels Copper Co.," on "The California Rand" (which was received with high appreciation by readers of the paper), on "Mining Litigation and Common Sense," on "Investing in Copper Shares," and on the "Design of Flotation Plants," the two last mentioned papers also evoking complimentary comment on the part of the subscribers to *M. & S. P.*

Parsons was married in 1915 to Miss Mary E. Snell. His especial hobby is to play daddy to their two small sons.

Mr. Parsons is now making a field trip for the purpose of investigating the present industrial status and the opportunity for the *Engineering and Mining Journal-Press* efficiently to serve the non-metallic industries. He will visit Kentucky, North Carolina, Georgia, Tennessee, Missouri, and the Rosiclare district in Illinois.

The Right to Work

By T. A. Rickard

IT IS ONE of the defects of our industrial system that the cause of a strike does not become a subject of general interest until the consequences of it have entailed inconvenience, if not disaster, to the community. One reason why the public generally is unable to arrive at a definite opinion on the merits of the dispute behind a strike or a lock-out is that most of the newspaper press is controlled by persons committed to one side or the other of the industrial quarrel. Of most newspapers, and magazines also, it can be said in advance that they will favor either the side of big business or the side of the working people; of only a few can it be said confidently that their policy is impartial and their attitude judicial in matters that require, above everything, a fair spirit and an unbiased mind. The railroad strike, which has caused so much disturbance already, and is not settled at the time of this writing, illustrates most of the defects of our industrial system. It began without an adequate effort to prevent it; it has run its course without an authority to control it; it will end without establishing a method for avoiding the repetition of it. The worst of all waste is the waste of experience.

One of the obstacles to a settlement of the railroad strike hinged upon a point of honor, namely, the question of seniority. According to rules, the employees that have been longest in service are given preference in the filling of jobs, and when they become too old for hard work they have the first chance to do the light work. When there is a decrease of business and the working force is curtailed, the men of junior service are the first to be dropped from the payroll. These and other rules to the same intent apply to the employee's status in the particular division or shop to which he belongs.

The President, in his effort to end the strike, proposed to both sides that the men return to their former positions "with seniority and other rights unimpaired." The unions accepted the suggestion, but the companies refused to do so. Then the President suggested that the point at issue be referred to the Labor Board. This seemed more fair than it was, because it was unjust to those who had remained at work. As soon as the strike started the companies engaged new men; obviously, it would be unfair to dismiss them at short notice and equally obviously it would be unfair to take back the strikers with their seniority and pension rights unimpaired as against the men that had remained loyally at work. The companies were in honor bound to continue the new men in their jobs and to give seniority privileges to those who had stayed by them during the strike, because they had promised to do so. Only one contingency could warrant the companies in ignoring their obligations to those in their employ at the end of the strike, and that would be a decision by the Labor Board or some other competent authority that the men on strike had been entirely justified in leaving their work, or, to put it in terms of economic warfare, that they had won the strike. No such justification exists, least of all for those who quit work without orders from their own unions. The outlaw strikes present one of the worst features of the recent happenings; they constitute a failure in the system of collective bargaining, which is the essence of labor-unionism. The abandonment of trains on the Santa Fe railroad at Seligman and Needles was inexcusable, not only because it caused suffering to innocent travelers in a desert region, but because it broke the agreement for a 30-day notice of the intention to stop work and because it was done without orders from the recognized leaders of the unions to which the trainmen belonged; in short, it was an act of sabotage. If organized labor is to receive public support it must play the game squarely. That, after all, is the one great desideratum, from both sides. In most strikes, as in this one, the principles at issue are beclouded by acts of bad faith on both sides; in most instances the cause of original disagreement could be settled amicably if the contestants lived up to their agreements and tried to carry out the spirit of them sincerely. They fail to do so; they obscure the question at issue by brutalities; they introduce new causes of resentment; so that in the end the strike becomes merely a fight, in which force, not reason, becomes the arbiter. The appeal to force is a step toward the jungle from which civilization has emerged painfully; it does not settle the principle at issue, and therefore only creates further opportunities for friction and fighting.

The suggestion of legislation empowering the Labor Board to give effect to its decisions is attractive, but we do not need Mr. Gompers to tell us that no law can be passed, within the four corners of the constitution, that will compel a man to work against his will—to do that would be slavery. On the other hand, a man must be at liberty to work when, where, and for whom he pleases. The right to work is the complement of the right to cease work. "A free American has the right to work without any other's leave," so says the President. The word "free" is redundant. The principle is implicit in our idea of democratic freedom. A citizen has the right to quit work, provided however that the second right is not abused by conspiring to do injury to another; similarly, an employer has the right to dismiss an employee, but an agreement between employers to dismiss all their workmen in order to lower their wages concurrently is a conspiracy. This idea is recognized in the Kansas Industrial Act, which makes it unlawful for any two or more persons to conspire or federate together, or to injure any other person by means of a strike or a lock-out, with the purpose of hindering, delaying, or interfering with operations that are necessary to the life of the community. This right to work, which involves the substitution of new men in the place of those who quit, ought to be sustained by all the forces of the Government, because it is a principle fundamental to our democratic life, and because it offers a means of checking industrial sabotage; but, on the other hand, we must face the corollary that if an employer performing a public service, such as a railroad company, can not fill the place of those who quit, that is, if the wages or conditions of labor are such as not to attract others to fill the vacancies, then the employer must modify his terms so as to obtain workers sufficient in number to perform the necessary public service. In short, a time comes when there is a deadlock, and it is that deadlock that it is the function of the Government to break by compulsory arbitration of the matter.

DISCUSSION

Promoting Efficiency in Drilling and Blasting

Further Explication of the Technical Details of the Art in Response to Varied Comment Evoked by the Author's Earlier Communication

THE EDITOR:

Sir—In the *Journal-Press* of March 18, 1922, you published an article by me entitled "Promoting Efficiency in Drilling and Blasting." In the last paragraph on p. 447 and the first paragraph of p. 448 I inadvertently stated something that was directly contrary to my knowledge and experience in the influence of pressure upon the burning speed of fuse. I greatly regret having possibly deceived some of your readers, but am grateful to the various correspondents who noted the error and called attention to it. Perhaps the emphasis given this matter will make an unusually strong impression on some readers of the *Journal-Press*, and so will serve a useful purpose.

In the *Proceedings* of the Royal Society, 1855, J. Mitchell stated his observation that time fuses burnt more slowly on a high mountain. Years ago St. Robert expressed the relation between the pressure (p) and the velocity (V) of the combustion of gunpowder with the formula $V = A\ p^{\frac{1}{3}}$, where A is a constant and p represented pressures varying between 722 and 405 mm. of mercury.

The retardation under diminished pressure is supposed to be due to the escape of the heated gases before they have time to heat the contiguous particles of gunpowder. In other words, the lower the pressure the more easily the hot products of combustion escape and carry with them the heat necessary for the ignition of the adjacent particles. On the other hand, by increasing the pressure the rate of combustion increases very rapidly. For example, Castan has estimated the velocity of combustion of gunpowder in the interior of a large-bore cannon to be 0.32 m. per second, whereas it attains only one-third of this value when burnt in the open air. The effect of pressure upon the rate of burning of fuse is indicated as a matter of importance of which mining men should take cognizance.

I further note that some of your correspondents take issue with my statement that electric exploders should always be connected in series and feel that it should be qualified. I realize that there is merit in their viewpoint and that the subject is a controversial one. There are some points which I did not elaborate upon and which lead me to prefer the series connection, although it may have some disadvantages. If the bridge wires are defective in electric exploders it is quite likely that they will fail in proper action no matter how they are connected. It seems to me that the failing least likely to be found is a materially variable resistance in the bridge wire used, since the manufacturers test each one for a maintenance of their standards in this respect. There may be a greater likelihood of such bridge wires becoming broken in transportation. The chief trouble, I fear, is the making of poor contacts by the miner in connecting the wires between exploders and the lead wires. With broken bridge wires or poor external connections, the parallel (or multiple) connection of electric exploders will permit some of the charges of explosives to be detonated when all of them are not so affected. With a series connection all of them can be expected to detonate or else none of them will (of course, barring the possibility of some undersized bridge wires, which I deem entirely unlikely). It therefore seems to me that, on the score of efficiency and safety, the series connection is a preferable practice. The use of "no delay" exploders is the solution I had intended to indicate in warning against the use of instantaneous electric exploders connected to electrical delay fuses.

Since electric lighting circuits usually carry a minimum voltage of 110 v., and for electric haulage in mines 250 v. is common, there is sufficient voltage available for blasting most rounds with electric exploders connected in series. Of course, the above voltages can be reduced to the proper values by rheostats, and the current will always be ample for heating the exploder bridge wires to incandescence. Where exploders are connected in parallel there is a danger that the miner is not expert enough to avoid trying to blast more holes than the amperage of his blasting machine will supply, or will need a higher current than the size of his lead wires will permit to flow from his source of electric power. Another advantage for series connections is therefore indicated, as less expert labor is required for such a practice.

Reference has been made by one critic to my remarks upon the possible influence of the shape of the confining surface about an explosive upon the useful work which a given quantity would produce in blasting rock. I had expected a storm of protest against this hypothesis, and since writing have had the opportunity of discussing the matter with the technologists of one of the large powder companies. They now grant the logical nature of the hypothesis presented. Regardless of the observations which may be made by Trauzl lead block tests, the question is: Does not the initial unit pressure produced by any given explosive in a container remain independent of the size or shape of the container or the quantity of the explosive, so long as there are no voids between the walls of the container and the explosive and the other conditions of temperature and pressure remain constant? If so, the total initial pressure is the product of the area of the bounding surface (which may be made variable by using differently shaped containers of equal enclosed volumes) and the above constant initial unit pressure. It is probable that the useful work in blasting rock depends to a certain degree upon the projected area of the drill hole upon the free face and will therefore vary with the diameter

of the hole. If the explosion develops a prism of rupture, as is commonly indicated, the effective area would probably be somewhat greater.

The questions I raised in my article have been discussed with some explosives manufacturers, and I understand that many of them have not received sufficient study and research to permit of positive answers. I find that there is a desire for these points to be considered by a co-operative research, and I trust that sufficient interest will be aroused to produce such a program and that the U. S. Bureau of Mines will feel inclined to take the lead in this matter as a disinterested, technical, and experienced body. In general, it seems that mine operators have looked to the explosives manufacturers as parties who have solved such problems by research and are therefore in the position to prescribe accordingly. It now seems to me that the manufacturers have partly felt that they will supply explosives of the properties required if the mine operator will definitely specify his needs. So between the two viewpoints there has been a hiatus which needs a definite program of research if it is to be filled, and until such work is done, we, as mining engineers and operators, are not applying to our work that knowledge and judgment which is usually accorded to acts of the engineering profession. We need a more thorough education in the science of explosives and the art of using them to break rock. For instance, we may buy straight dynamite as of 40 per cent, 50 per cent, 60 per cent, or 70 per cent strength.

What do these figures mean, and should their value be in direct proportion to them? As a matter of fact, the accredited ballistic pendulum tests used as a standard by one of the manufacturers show that the ratio of power of the above strengths of dynamites varies as only 1 is to 1.16, to 1.26, to 1.34, respectively, or considerably less than the ratios of the percentages by which they are classified. BENJAMIN F. TILLSON.

Franklin, N. J.

What Is the Matter with Mining?

THE EDITOR:

Sir—The discussion as to "what is the matter with mining" is very interesting and quite timely just now. The prospector is practically gone, and it is well that is so. It was a hard isolated life, rarely profitable, and when a considerable sum of money was made, the translation to city life was generally too much for Mr. Prospector. Many, some of the most successful, died in some county hospital. The United States is no longer wild.

The "grass-root mines" are about all found and are being worked or have been exhausted. There is almost nothing being done to replace them. Even the old-time miner is about gone. He was a good hammersman, a good timberman, and could drift through soft ground or sink a wet shaft. Now we have underground laborers, mechanics, young collegians, and a few real miners, generally foremen, to make up a crew.

We are coming to the time when "geology" must be dug out as the oil men are now drilling "structure." Now, mining companies keep men scouting in this and other countries, and have card catalogues of everything within certain limitations. In one region the land has been systematically cross-sectioned, paced and mapped so that every foot of ground has been under observation. The wonder is, when will mining companies see the futility of present methods. The fad of employing youth is responsible for some of the trouble.

In the whole field of expert mine examination there is nothing so dangerous as a prospect. It requires the highest degree of experience and skill to select from the many unprofitable outcrops of ore those that may possibly become valuable. Often young and inexperienced men are sent on this work. On the other hand, older men are too cautious; they know to their own cost that if a prospect does not turn out well that it will be some time before they find another job. The way to play safe is to find some fault (which is easy) and turn it down. Another source of trouble is that if a prospact is recommended for exploration and development, someone else is put in charge of the work and it is carried on under different plans than those designed.

The most common stumbling block is the price. The general public is inclined to think that a mine is treasure trove and that every vein makes a mine. By the time the men about town have got hold of a proposition and increased the price to a point where it will attract attention among larger operators or has reached some one who has a pull with the officials of one of the larger mining companies, it is loaded. I made a long trip once to see a hoped-for mine on the Pacific Coast. The five claimants wanted $5,000 each, but when the proposition reached Boston the price was $250,000. When a man finds something promising he sometimes works until he has earned enough to buy the needed supplies, but more often goes to town and rustles a "grub stake." The property soon gets into the hands of some merchant, lawyer, or real-estate man, then passes on until it reaches some investor or mining company, always picking up an unearned increment, until the price is out of sight.

The more common investor is the tenderfoot. He generally puts one of the promoters in charge, a man who is a good romancer but with no knowledge of mining. Occasionally, one of these men has "good horse sense" and works out. There was an instance in Mexico where several investors went out to see work started at the mine. During the evening it was decided that "our assayor" must have pure chemicals and water. Ten carboys of distilled water were ordered from John Taylor & Co. in San Francisco. This water was shipped 1,500 miles by rail, 120 miles by wagon and over 100 miles on pack animals. The local water was free from chlorides and there was a steam plant and mill at the mine.

Limited capital is another source of failure. As time goes on more expensive and complete equipment seems to be required; also greater care and time spent in investigating the method of ore treatment. There seems to be no place for the small mine, which in the aggregate should produce considerable ore. If more men would get out and hunt mines for themselves instead of jobs it would be better.

Some changes in the mining laws would help matters in the United States. The assessment law enables men to hold claims for a long period of time without doing anything. It also causes much perjury. If $100 were paid into the federal treasury as a tax and the various claims were taxed by the states at the price asked of a purchaser, some promising prospects would soon pass into the hands of those who would make use of them. In Mexico 1,200 claims have recently become void by the non-payment of taxes by speculators.

Apartado 72, Chihuahua, Mexico. H. H. TAFT.

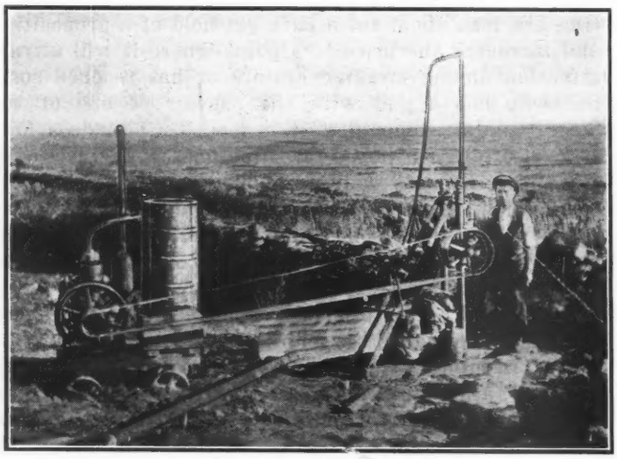
Mining Barytes in Ireland

Operations of a Profitable Mine in County Cork — Modern Equipment Used — Description of Mining and Milling Methods — Work Stopped by Sabotage — Other Deposits of Pure White Barytes Await Development

By Frank H. Ahier

THE RECENT change in economic conditions in the Free State of Ireland is resulting in activity in the mining industry.[1] It is hoped that the new mining laws that will be enacted under the Free State will be favorable to exploration and exploitation, so as to attract investigators and, in time, develop the mineral resources of the country.

During a residence of six years in County Cork, I have been able to study the orebodies of the southwest



Prospecting for barytes near the Deveenalomane mine

part of this district. The area is highly mineralized and has been mined in the past by Cornish miners for copper glance or chalcocite, chalcopyrite, bornite, and barium. In recent years the only mineral mined has been barytes. The locality in which the principal lodes of barytes occur is bounded on the north by the village of Durrus, on the south by Roaring Water Bay, on the west by Mount Gabriel, and on the east by Hill Pekin.

The geological formation consists of the blue, green, and gray slate or grits of the old red sandstone, the valleys being overlain with good peat. The main mineral lode of the district strikes approximately N. 45 deg. W., and dips southwest at 80 deg. At Deveenalomane is a small mining camp erected by the company that mined this lode. The lode crosses the road running from Durrus to Ballydehob, at Deveenalomane, and was worked up to 1920, under my direction, for the Dunmanus Bay Barytes Co., Ltd., of London.

Lode Is Irregular

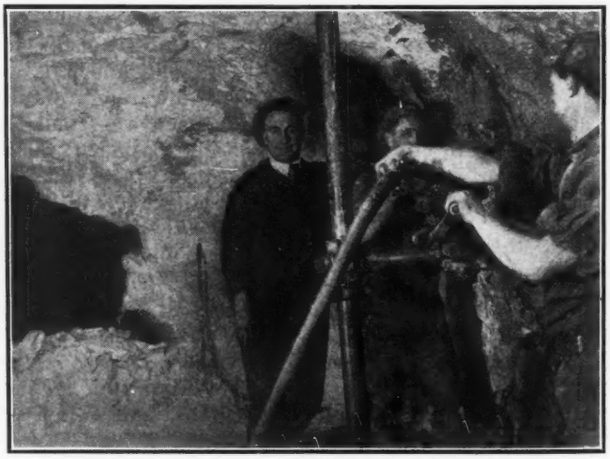
The lode is a lenticular or "sausage" formation. The hanging wall is completely broken and crushed, the foot wall being hard and smooth. The lode increases from a mere thread in a horizontal plane to a width in several places of 12 to 16 ft. of solid, snow-white barytes. These great bunches sometimes contain a part of the adjacent hanging wall, which probably fell in when the filling of the vein was in progress. The copper lodes of the district strike approximately at right angles to the barytes lodes. They have been located in the Deveenalomane mine coming up to the barytes but never crossing it; here one can get proof that the barytes lode is the oldest of the district. In the Deveenalomane mine the copper-bearing rock is of too low grade for mining.

The Deveenalomane mine was first opened about 1854 by small tributers. It was taken over by the Deveenalomane Mining Co., Ltd., of London, in 1904. This company unwatered the main shaft down to the forty-fathom level, then the bottom of the mine. It sunk another thirteen fathoms and opened a good orebody on the fifty-three-fathom level. During this period a new mill was erected. The property was taken over in 1914 by the Dunmanus Bay Barytes Co., Ltd., which at once started stoping between the forty- and fifty-three-fathom levels.

Development was pushed; a winze was sunk in the orebody to the sixty-three-fathom level, and this level was driven northeast and northwest of the winze, exposing an orebody 200 ft long, of an average width of 8 ft., of snow-white barytes. Development work was advanced rapidly enough to keep ahead of the mill, a depth of seventy-six fathoms being reached. The orebody was cut in two by an intrusion of quartz, which eventually displaced the barytes at the ninety-six-fathom level as the walls of the lode converged.

Lateral development was pushed northward on the fifty-three-fathom level toward the old workings in the direction of Durrus. An orebody 50 ft. long and averaging 4½ ft. wide was found, but no stoping was done, owing to the fact that the ore showed a slight iron stain from the percolating waters coming from the old workings.

The system of mining employed was the driving of



Barytes lode on the sixty-three-fathom level. The walls are dark

levels 6½ ft. high and 5 ft. wide from the main shaft to the orebody; when this was reached they widened to the width of the lode. Levels were at intervals of 60 ft. vertically. Tracks of 16-lb. rail were provided for hand-tramming cars having a capacity of 112 lb. of ore.

[1]This was written in March, 1922—Editor.

The orebody was blocked out by means of winzes or raises every 60 ft.; these served for ventilation and for filling after stoping. Overhand stopes were started from the stull pieces. A 7-ft. bench would be cut, and the space would be filled with debris from the development faces on the levels above or with material taken from a small rock shaft.

The stull pieces, varying from 6 to 20 ft. long by 12 to 18 in. square, were placed 2 ft. apart. They were well hitched in the foot wall and placed on an angle of 55 deg. against a wall plate on the bad hanging wall. The timbering required the services of two careful and experienced miners.

New Mill Erected in 1914

An up-to-date mill was erected, and at that time—1914—it was considered the best in the four kingdoms. The flow sheet is shown on this page.

The capacity of the mill was forty tons per day (twenty-four hours). The ore received from the mine was tipped over a grizzly, from which the fines (passing 1¼-in. ring) went to four jigs, in which most of the country rock was removed. The barytes was dried by means of a flat kiln, and from there it entered the main mill at the rolls. The fines were never treated together with the lump ore, but were kept in stock and ground when a sufficient quantity had accumulated to keep the mill grinding three to four days. The fines made second and third grades. The lumps were treated as shown in the flow sheet. From the grizzly they were washed and any adhering waste was knocked off. They then entered the breaker or crusher through a chute.

The mill was automatic; the barytes was not moved by hand from the time it was fed into the crusher until it passsed from the Newago screen into bags to be sewed up. Each bag contained 224 lb. I may say here that our tube mill gave us excellent results, and, from tests made, 60 per cent of the product could pass a 200-mesh screen and was ready for the market. Unfortunately, although we tried numerous patented machines, we could find no device that would separate the fines from the rough, and we had to send all the tube-mill product to the Buhr stones. After passing this through one pair of Buhr stones we could send it to market as the "Best British White Barytes."

Our bagged product was stored in a warehouse next to the mill, in which was a terminal of an aërial tram made by Ropeway, Ltd. It was 7,000 ft. long, with a capacity of eighteen tons per hour of barytes in bags, and ten tons of coal in buckets. The other terminal was on the company's island jetty in Dunmanus Bay. Here steamers came alongside and loaded for the different markets in England.

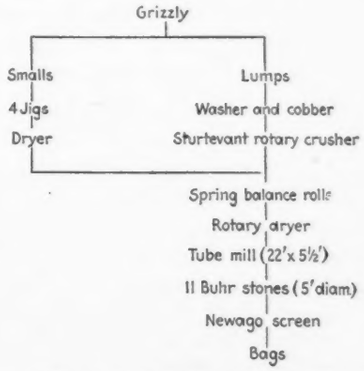
The mine and mill were operated by a 175-hp. Campbell suction gas engine, which transmitted its power through a belt to a line shaft from which the different units of the equipment were driven.

Hoisting was done by steam, and an 80-hp. Ingersoll-Rand compressor supplied air at 80-lb. pressure to Holman 2½-in. piston drills, for drifting; hammer drills, for sinking; and telescopic drills, for stoping and raising.

The miners of the locality had been taught by the Cornish, winning copper ores in old days, and had a good knowledge of hand drilling and timbering. After two good drillers who had had experience on the Rand had been put to work, the local miners soon got the knack of using machines. Gas enginemen and mechanics were trained at the mine, so the whole mine and mill were operated by local labor under skilled supervision.

Unfortunately, in September, 1919, fire entirely destroyed the plant. The buildings were not restored, but the company came to an agreement with a neighboring company whereby it bought our crude, which we sent over the ropeway to its steamers at the jetty. However, on the Thursday night before Easter, 1920, our tramway was maliciously broken, and mining operations ceased. The mine closed and the machinery was sold. The company paid regular dividends from 1914 until the end in 1920.

This is the only orebody in the neighborhood that has been mined by up-to-date methods, although further toward Cork another deposit of barytes is being worked. Today, in the Ballydehob district, there are virgin lodes of pure white barytes which can be traced for a distance of a mile, awaiting capital for the necessary development before erecting a mill. The roads are ordinary country roads over which a Ford car can travel. The railway runs from Skibbereen through Ballydehob to Skull, which is the nearest port. Mining stores can be bought in Skibbereen or Ballydehob.



Flow sheet of barytes mill

Engels Copper Increases Output

In Plumas County, the Engels Copper Co. is one of the few copper mines in California being worked this year, and for the first five months of 1922 its output of copper was 5,630,628 lb., as compared with 4,439,040 in the corresponding period of 1921. Tunnel No. 10, now driven 3,700 ft., will have a total length of 7,600 ft. and will cut the orebodies of the Engels mine 500 ft. below the present lowest level. The company is installing additions to its flotation plant and planning further drilling and development of the Superior mine. The Walker Mining Co., at Portola, closed for some time, resumed operations May 22, 1922, and is now producing daily about 40 tons of concentrates containing 20 per cent of copper, 7 oz. of silver, and a little gold. At Quincy the Plumas-Eureka Annex Co. has purchased the Jamison group of mines, which have not been worked for some years, though formerly productive. After many years of idleness the Emigrant Hill gravel mine, three miles from Quincy, has been reopened and the channel is being mined. In Sacramento County the Natomas Consolidated, of California, continues working all its dredges in the Folsom field, and if conditions do not alter, the remaining proved ground has an estimated "life" of ten years.

A Résumé of Electrolytic Zinc Practice*

Fundamental Principles Are Simple, but Impurities Are Particularly Troublesome, and Details Must Not Be Overlooked—Process Attractive for Complex Ores If Power Costs Are Reasonable, and Is Likely to Receive Much Wider Application

By John T. Ellsworth

AMONG the important developments of modern industrial progress, one of the most interesting, as well as one of the most economically important, is the use of electricity in non-ferrous metallurgy. Although considerable improvement has been made in reduction of costs, and in types of furnaces, the fire-smelting processes still remain wasteful, especially in the treatment of complex ores. In contrast to these, hydrometallurgical processes promise eventually a much better percentage recovery of metal, a cleaner separation of the different metals in complex ores, and, consequently, lessened production costs.

The farthest advanced commercially of the wet processes for metals are those for electrolytic copper and zinc. Zinc was produced commercially from both chloride and sulphate solutions in Germany about 1890, and in England at about the same time, from chloride solution, but, on account of experimental difficulties and of the considerable investment necessary to build even a very small commercial plant, little was done in this country until 1915, when the General Electric Co., at Bully Hill, Cal., and the Anaconda Copper Mining Co., at Anaconda, Mont., undertook to operate small plants to substantiate favorable results obtained in their laboratories.

Anaconda Plant the Largest

The Bully Hill plant, one at Keokuk, Iowa, and one at Denver, Col., after a good deal of experimentation, chiefly with flue and baghouse products, have suspended operations for an indefinite period. There are, however, three plants in this country and a plant in Canada that have been operating almost continuously until the recent extreme depression in the price of zinc. The largest and probably the most successful of these plants, all of which are treating low-grade concentrates, is that of the Anaconda company at Great Falls, Mont., which produces about 175 tons of cathodes per day. The plant of the Consolidated Mining & Smelting Co. at Trail, B. C., produces about 75 tons, that of the Judge Mining & Smelting Co. at Park City, Utah, about 10 tons, and the Electrolytic Zinc Works at Martinez, Cal., about 2 tons per day.

The description of the process which is here attempted is that of the general plan which is being followed by the plants which are treating a more or less low-grade concentrate, as they seem, thus far, to have been the most successful.

The fundamental principles involving the zinc alone are simple, involve practically no metal losses, and may be briefly stated as follows: Zinc blende (ZnS) may be roasted easily to the oxide, which is quite soluble in dilute sulphuric acid. A solution of zinc sulphate can be electrolyzed with a direct current which will deposit the zinc on a suitable cathode and replace in the solution a proportional amount of sulphuric acid, which in turn may be used for further leaching of zinc oxide.

The process as applied to complex ores is not so simple and can best be considered under separate headings, alluding to the four principal operations, namely: Roasting; leaching and purification of solution; electrolyzing; and melting of cathodes.

Principles of Roasting

The minimum temperature required for the roasting of zinc blende is about 600 deg. C. The most economical temperature to use on the usual low-grade concentrate is somewhere between 650 and 725 deg.

The main object desired is as nearly as possible a dead roast, with the minimum formation of ferrite, which is generally considered to be a double oxide of zinc and iron and which is insoluble in dilute sulphuric acid of the strength usually found convenient in the electrolytic plant. Either the oxide or the sulphate roast may be used. The furnaces ordinarily used are six- or seven-hearth McDougall or Wedge type, fired with coal or oil. These furnaces are well adapted to the sulphate roast, which consists in exposing the concentrates for fourteen to sixteen hours to a temperature of about 650 deg. This roast is necessary when the material treated is high in iron, say around 20 per cent, on account of the more rapid formation of ferrite at higher temperatures. If the iron is around 10 per cent, the oxide roast with a temperature of 700 to 725 deg. is preferable, but the time should be lengthened to at least twenty-four hours in order to lower the percentage of sulphide sufficiently to avoid its concentration and rehandling from the leach residue, which is often necessary with the sulphate roast.

Methods of Leaching

The leaching is usually done in pachuca tanks, although this particular type of tank is not necessary, the zinc oxide being very soluble in dilute sulphuric acid. Air agitation is found best, on account of keeping the coarser particles in suspension and also for the beneficial effect of slight oxidation.

The first separation of metals is effected by this leach; most of the zinc, manganese, cadmium, copper, alkali, and alkaline-earth metals and soluble silicates go into solution, and the lead, silver, gold, part of the copper, and most of the arsenic and antimony remain in the residue.

There are different methods of conducting this part of the process to avoid the loss of recoverable zinc in the filter cakes. One of these is the continuous acid leach, which consists in filtering off the residue while still acid and then neutralizing the filtrate with lime or calcine, returning this second residue to the original acid leach. It is necessary to neutralize the solution to precipitate the iron as hydroxide or basic salt and to free the solution successfully of copper and cadmium by means of zinc dust, without using an exorbitant excess.

*Most of this paper was originally presented by Mr. Ellsworth before the Utah Society of Engineers.

Several complications occur in the filtering operation: (a) Formation of ferrous hydroxide; (b) precipitation of zinc hydroxide; (c) precipitation of calcium sulphate and other basic sulphates; (d) formation of gelatinous silica. It is difficult to oxidize the iron thoroughly and the resulting ferrous hydrate is hard to filter. Then, in order to precipitate the ferrous iron and form a well coagulated residue, which helps to carry out gelatinous silica and the finely divided antimony and arsenic compounds, an excess of the neutralizing agent is added, which tends to precipitate zinc. If the concentration of zinc in the solution is high (10 per cent or over), this loss may become serious when the acid leach is not used.

Practically all of the soluble sulphates of the metals commonly found in zinc ores crystallize with a large amount of water of crystallization, and in a cyclic process, unless otherwise separated, all of them must gradually increase to the saturation point. It is at this point of neutralization and filtration, with attendant cooling, that these start to crystallize out, forming crusts in the fiber of the filtering medium which slow down the operation and leave large amounts of solution in the filter cake. The amount of washing which can be done without equivalent evaporization is limited by the minimum of dilution of solutions allowable for economical operation. Too much of this fine, bulky precipitate cuts down the metallic value of the leach or purification residue, when filtered neutral or basic. The silica which enters the solution when acid in the form of soluble silicates becomes gelatinous as soon as it is neutralized and also seriously interferes with filtration.

Copper is separated completely enough by agitation with zinc dust. The cadmium is deposited in the same manner, but with air agitation care must be taken not to continue agitation too long after addition of the dust, because whatever amount of cadmium becomes oxidized will replace zinc in solution. By long-continued agitation with water alone, most of the cadmium can be separated from these residues. This fact is the basis of some processes for the separation of these metals when in the form of sulphates.

Procedure in Electrolyzing

The electrolysis of pure zinc-sulphate solution, although harder to accomplish than that of some other metals, can be carried out satisfactorily by means of pure lead anodes and aluminum or zinc sheet cathodes. The chief hindrance to the formation of smooth, heavy deposits is the reduction of hydrogen to the gaseous state. Contrary to the earlier statements of scientists, zinc can be deposited with good efficiency from quite strongly acid-sulphate solutions so long as a considerable number of zinc ions are present. About 20 g. per liter is usually considered the minimum allowable concentration of the zinc for efficient deposition, although sometimes this can be lowered. Some hydrogen is always set free, but the amount does not seem to make so much difference as the manner in which it is freed from the electrode. At very low acid strength and in some other instances the gas collects in large bubbles, which stick to the plate. Zinc forms around these, and the surface becomes rough, a larger proportion of current is attracted to the high points, the deposit becomes still rougher, and the current efficiency decreases rapidly with the increased age of the deposit. Higher current densities and acid strength, as a rule, tend to decrease this effect, but the rough deposits can be obtained under these conditions, as well as smooth ones with fairly low density and acid strength.

With stationary electrodes, insoluble anodes and pure zinc-sulphate solution, between three and four volts are necessary to deposit zinc with the usual spacing of two inches between centers of electrodes. By proper regulation of feed, this voltage can be held at an average of 3.2 and a good average of 85 per cent current efficiency obtained. This gives a power consumption of 1.40 kw-hr. (d.c.) per pound of zinc. Soluble anodes would decrease the voltage and consequently the power consumption, but good deposits could not be obtained from ores or residues containing impurities. It can easily be seen that one of the absolute essentials of the process is a power cost below $40 per kilowatt-year, as this means, under the best conditions as outlined above, assuming a ratio of unit cost of a.c. energy to unit cost of d.c. energy of 75 per cent, an ideal cost of 0.855c. per pound of zinc. These conditions have probably not as yet been held consistently by any commercial plant.

The causes of lowering of deposition efficiency are the action of the hydrogen bubbles and that of impurities. The effect of impurities can be divided into four classes:

Metals which have a lower decomposition voltage than that of zinc.

Metals which have different valences in sulphate solution.

Products of anodic oxidation.

Suspended solids in the electrolyte.

One of the well-established laws of electrolysis is that the reduction accomplished at the cathode and the oxidation at the anode are, respectively, those which are the easiest of accomplishment. Another is that the oxidation at the anode must always be equivalent to the reduction at the cathode. With zinc-sulphate solutions the easiest reduction is that of zinc ions to the metal. This is balanced at the anode by the oxidation of lead to lead peroxide, that of oxygen to ozone, and, in the usual commercial plant solution, that of manganese to manganese dioxide and permanganates.

The first class of impurities, of which copper is a good example, having a lower decomposition voltage than that of zinc, will deposit before it and in such form that the zinc cannot form a firm deposit over them.

The second class, of which iron is an example, do not deposit at all, but are reduced to the lower valence at the cathode and reoxidized at the anode; this action uses up current and, although not necessarily injuring the appearance of the deposit, causes marked lowering of current efficiency.

The third class, of which manganese dioxide is the most common example, are finely divided solids which are formed at the anode, become positively charged, and migrate to the cathode, where they become imbedded in the mass of the zinc deposit. When in sufficiently large quantities to create trouble, the usual effect is to cause holes in the zinc, which gradually enlarge with age of deposit.

The fourth class of impurities consists of solids which are suspended in the electrolyte and, either by becoming positively charged or because the solution circulates toward the cathode, tend to make the zinc deposit irregular and non-adherent. The presence of these solids may be due to faulty filtration, or, as is more common, to salts which become super-saturated, owing to the natural diminution of volume which is caused by

the formation of hydrogen and oxygen. Salts which are displaced from solution at the neutralization point are still almost saturated when reaching the cells, where some of them start to crystallize again, even though the solution is acid. The effect of this action is more marked toward the lower end of a cascade of cells, whereas the effect of the first three classes of impurities is most marked where the new solution enters the cell system, or at the head of the cascade.

Still another cause of poor efficiency is lack of prompt attention to cells when making poor zinc from any of the above causes. The natural voltage of a zinc cell, with power cut off, is, of course, just about the same as when in operation, but with opposite direction of emf. If a cell is working at low efficiency this effect is local, and zinc may be depositing on one part and dissolving rapidly from another part of the same plate. The effect of this action, if long continued, is to form a film of white lead oxide or sulphate on the anode. After such a film is formed, it is impossible to deposit zinc from the purest of solutions, and new anodes must be used.

The Melting of the Cathodes

The melting of zinc cathodes, providing they are obtained fairly smooth and solid, is not difficult, although a small amount of dross will always be formed on account of the ease with which zinc is oxidized. However, in case of soft or sprouty cathodes, which may contain zinc oxide or sulphate, dross is much more easily formed, and melting efficiency may be considerably lowered. The usual procedure is to fire above the charge in a reverberatory furnace with a reducing flame, using a bath of sufficient depth that a good part of the melting is done beneath the surface.

The percentage recoveries of zinc by this process have not, as a rule, been high, and have varied widely with local conditions. Thus, a 95 per cent solubility can be obtained with one ore and only 80 per cent with another; solutions at one plant may consume twice as much zinc dust as those at another, and so on. This, however, is merely because of the difficulties encountered in working out the complex details of practical operations as applied to local conditions. The successful operation of any department of the plant is absolutely dependent upon like conditions in the other departments. A poor roast will cause a poor leach and make the filtration difficult; a small amount of certain impurities allowed to go to the cells may lower the current efficiency 20 or 30 per cent and make a poor deposit of zinc, from which twice the usual amount may be lost as dross.

The Electrolytic Process Reviewed

Although this brief outline may have unduly emphasized the difficulties and disadvantages of the electrolytic zinc process, it has been done because these are naturally of most interest to those who have to do with problems of industrial operation, and to indicate the direction along which improvement will be made to evolve the most successful flow sheet.

The success of the process for a given locality depends on the cost of electric power, the character of the ore in respect to its adaptability to the leaching and purifying operations, and the amount and value of the metals combined with the zinc. Given favorable conditions in these respects, the advantage of producing a high-grade zinc product and of concentrating the other metals in residues which are quite suitable for either the common fire treatment or other methods, make this process one which is well worth a still further expenditure of time and money to perfect. It is already the only reasonable method of treating the ores in certain localities, and the time is not far off when its use will become much more general for complex ores, if power resources are not monopolized and held at prohibitive rates.

Finally, on account of the many details concerning the other metals present in these ores, a proper understanding of which is necessary for successful production of zinc, the process is likely to be the foundation for electrolytic processes for some of these other metals.

New Zealand Completes Waihi Survey

A resurvey of the Waihi gold field, in New Zealand, has recently been completed, and the director of the Dominion Geological Survey, P. G. Morgan, has issued a preliminary report. He advocates extensive lateral exploration and sinking to a depth of about 2,000 ft. Some of the conclusions reached by Bell and Fraser in 1912 have been found to be untenable. For instance, the hypothesis was advanced that an intrusive mass of dacite contained the principal orebodies at Waihi, but this has been completely disproved. It is expected that the famous Martha lode will meet the Empire lode at or about 2,000 ft., where an enrichment is likely. In general, a long life for the field is predicted.

The report of the Waihi Gold Mining Co. for 1921, recently issued, follows:

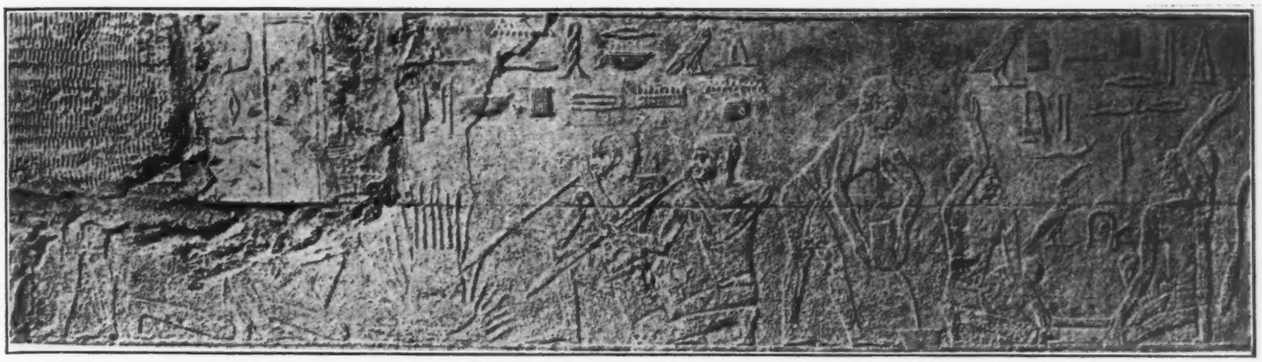
Depth of mine, feet	1,616
Ore reserves, tons	681,860
Average value per ton (34.14s.)	$8.19
Lodes mined	18
Mill operated, days	270.3
Average number of stamps dropping	106
Average number of tube mills running	6.6
Ore crushed and treated, tons	164,042
Stamp duty, tons per day	5.72
Assay of ore (31.66s.)	$7.60
Actual extraction, per cent	91.6
Doré bullion produced, oz	459,654
Value for 1921	£307,972
Dividends paid in 1921	95,731
Market value of investments at end of year	317,420
Other cash assets (stores, war loan, hydro-electric plant sold to N. Z. Government)	262,000
Total output to date (end of 1921)	13,335,900
Total dividends paid	5,919,803

Onyx in Arizona

Onyx, or onyx-marble, has been mined commercially in a number of Arizona localities. One deposit, of the rare brown onyx, is now being worked about twenty miles south of Canyon Diablo station of the Santa Fé railroad. It was discovered in 1894. A carload of the material was worked up into articles such as table tops, which found ready sale at the Chicago World's Exposition. It is found in veins. The color is uniform, though shading into amber.

At Phoenix, a factory is being operated by H. C. Cook for the production of articles made of onyx, which is secured from a quarry in the Cave Creek district, about thirty-five miles north of Phoenix. This quarry, opened about thirty years ago by B. Heyman, contains material of notable beauty, of nearly all colors, veined and mottled. The deposit now is difficult of access, and a motor truck road to it is being built.

At Mayer, on the Bradshaw Mountain railroad, south of Prescott, is a very large deposit of pseudo-onyx, mined years ago for interior finishing of several New York office buildings. It was owned by the famous Capt. "Buckey" O'Neill, who sold it a few months before he was killed in a Rough Rider charge in Cuba, in 1898.



Smelting, casting, and beating, from a tomb of the Fifth Dynasty

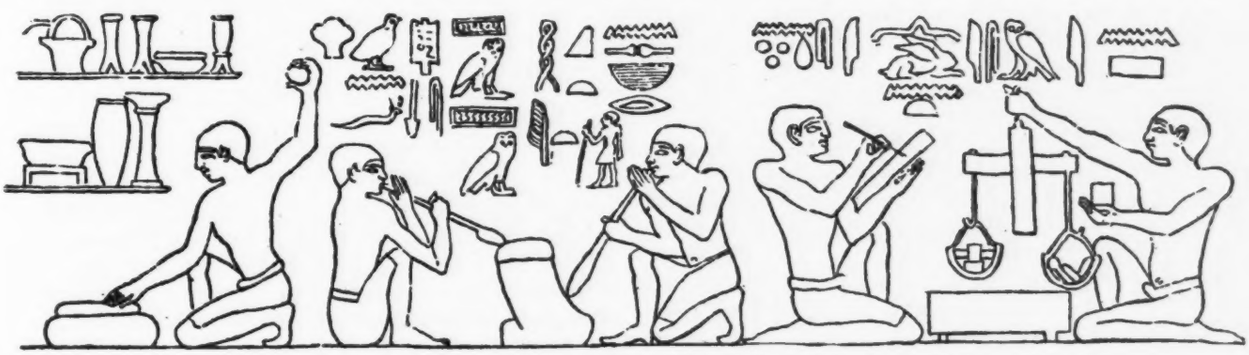
An Illustrated History of Mining and Metallurgy—I

Records in the Form of Drawings and Writings Indicate Ancient Egyptians Conducted Mining and Smelting in a Manner Comparable to Advances in Other Industries —Mine Map Made in Time of King Seti I Earliest Known

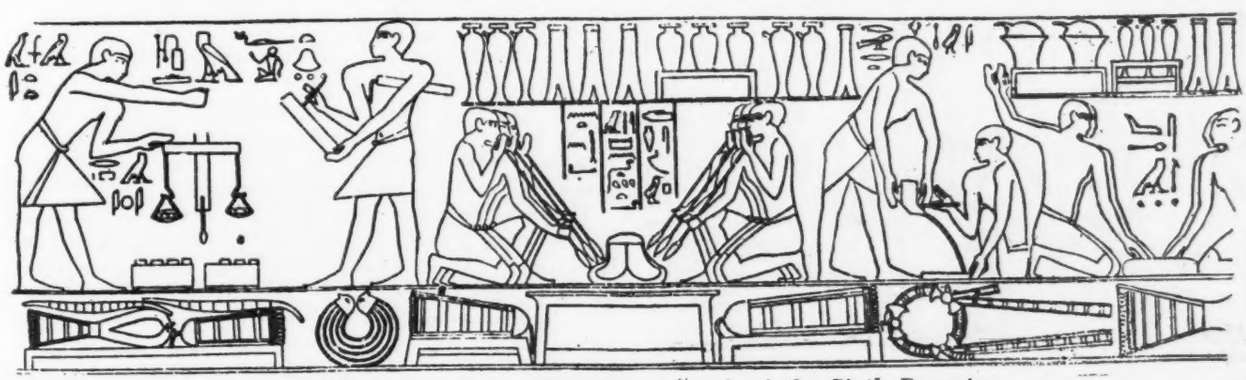
BY H. H. MANCHESTER

THE EARLIEST RECORDS of mining antedate even the dawn of civilization. One reason for this is that the prehistoric Egyptians buried various weapons and utensils in their graves, probably with the idea that they would be of assistance to the spirit in the hereafter. In the earliest prehistoric graves are found copper harpoons, chisels, and pins, the heads of which were formed by simply rolling over the shank. Somewhat later, but still in the prehistoric age, daggers and spearheads, also made of copper, were buried with the body. From about the same period, about six thousand years ago, came relics of gold, silver, and lead. Electrum has been discovered in tombs of the First Dynasty. This was no doubt a natural mixture of gold and silver such as came from the Nubian mines.

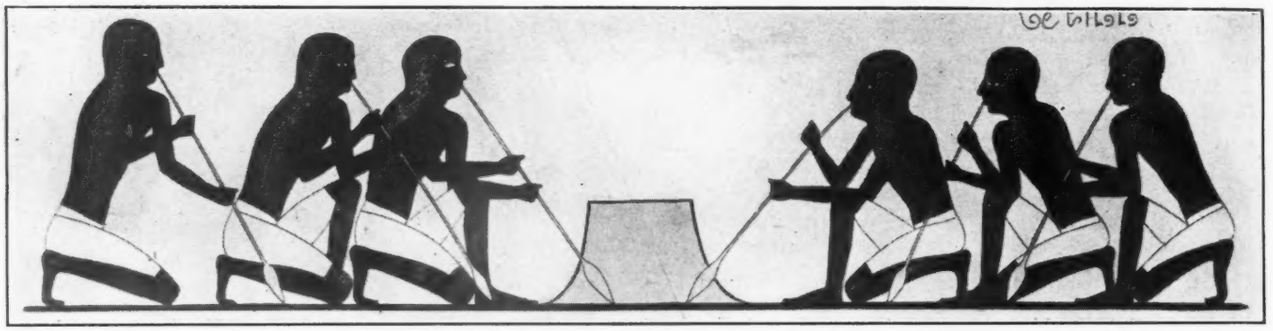
In prehistoric times it was already discovered that some copper ores, with the imperfect method of smelting then employed, produced a harder metal, and one better suited for tools, than others. Some of the earliest prehistoric tools were hardened through the pres-



Smelting, beating, and weighing in the old Empire of Memphis



Smelting in small crucibles, from a tomb of the Sixth Dynasty



An ancient Egyptian battery of blowpipes

ence of about 4 per cent arsenic in the metal, and in others this effect was produced by as little as 1 per cent of bismuth. A bronze rod was discovered in a mastaba, or tomb, of the Third Dynasty of Meydum, but specimens of bronze from this period are too rare and questionable to prove that the amalgamation was then known.

A few relics of iron, likewise, have been unearthed among the remains of the Old Kingdom of Memphis, but they are so scarce as to prove that if iron were known at all in that era its use was exceedingly rare.

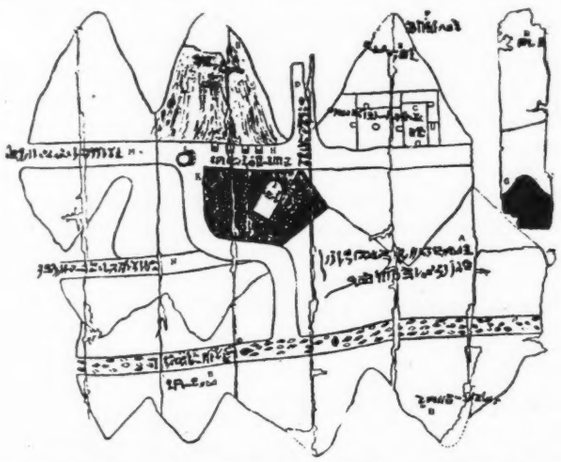
The greatest supply of copper seems to have come from the Sinai Peninsula, to the east of Egypt. The mines were worked at certain times, though probably not regularly, as early as the First Dynasty, but they were opened up more extensively by King Snefru in the Third Dynasty, and he was afterward looked back upon as the great patron of mining there. A number of the roads leading to Sinai, and stopping places on the way, were named after him, and he was honored along with the god Hathor as the protector of miners.

Much of the mining at Sinai was done by expeditions which were dispatched from Egypt to work during the most favorable months and then return. A proof of this is the inscription left on the rocks by a leader of such an expedition in the Fifth Dynasty. At about this period the mines of Sinai began to be worked for turquoise. This was highly valued in Egypt and was the object of various expeditions. An inscription of that dynasty mentions that the god had caused precious stone to be found in the secret mine, which probably refers to turquoise.

The earliest Egyptian mining tools discovered are stone picks, flint and stone chisels and scrapers, wooden mallets, and stone hammers. The mallet was the shape of a policeman's club; that is, all handle with no head; the hammer, on the other hand, was only a semi-globular piece of stone, thus being all head and no handle. When copper came in it was used for chisels and hammers. The skill of the Egyptians with such rude tools is evidenced in the work they did.

The small furnace long continued to be used for gold

There is no Egyptian account of smelting dating from the Old Empire of Memphis, but several pictures from that period suggest how it was done. In a tomb of the Fifth Dynasty at Sakkara, the ore is apparently in a crucible in the midst of the fire. Around this are



An ancient Egyptian map of a gold mine district—the earliest known map of a mine

sitting several workmen in whose hands are long tubes through which they are blowing the fire. A somewhat similar tomb painting at Sakkara illustrates not only smelting the ore but casting and hammering the metal. In both of these pictures the fire was unprotected from the wind, but there was also a small furnace which was like a pot, with one side of the rim raised as a guard against the wind. In this furnace charcoal was burned, and it was probably used for small amounts of gold. A picture of it represents a workman with a short blowpipe in one hand and a pair of spring-backed tongs in the other.

Few records have been found in Egypt from the Sixth to the Eleventh dynasty. But in the Twelfth Dynasty, more than four thousand years ago, mining operations in Sinai were again resumed.

The road to Sinai was no doubt dangerous because of the heat, and the operations themselves might be interrupted by accidents. On this subject we find Sabek-hir-hab congratulating himself in an inscription: "I hollowed out a mine chamber for my king, and the full number of my youths returned: none among them perished. . . . Give praise to the king, the mountains yield what is within, and the hills proffer their

riches." The leader of the expedition was commanded to bring back a certain quantity of turquoise, and perhaps copper, and in carrying out the work he divided his force into gangs of five, with foremen and superintendents. An inscription of Amenenhat in the Twelfth Dynasty declares: "I arrived at the mine of Ka; I procured the quota of turquoise, being . . . for each five men each day. Never had so much been done since the days of the king of Upper and Lower Egypt, Snefru the blessed."

Some of the difficulties met by the expeditions are suggested by an inscription by Harurre, who entered Sinai during the hot season. "I came to the district in the third month of the second season, although it was not the season for travel to the mineland. . . . The treasurer of the god said: 'Let not your face flinch on this account; behold Hathor will turn it to advantage.' I looked to myself and considered when I came from Egypt. My face flinched and it was difficult for me. The plateaus are parched in summer, and the mountains sear the skin. . . . When I asked the workmen about it they said, 'There is turquoise in this mountain forever,' which was pleasant to hear coming at this season. I began to work fortunately. My force arrived in full numbers; none among them perished; my face recoiled not before the undertaking. I succeeded in mining the best stones, and completed the work in the first month of the third season. I brought back genuine precious stones, more than anyone who had come here, and more than the quota; even better than in the usual season. . . . I led my force very considerately, nor was I harsh voiced to the workmen."

The principal sources of gold in early Egypt were probably Nubia and Coptos. In the Twelfth Dynasty Ameni describes the southern expedition for it as follows: "I sailed southward to bring gold ore for the king of Upper and Lower Egypt. . . . I sailed with 400 of my best troops, all of whom returned in safety, without the loss of a man. I brought the quota of gold commanded me, and was praised for it in the palace." Ameni also went on an expedition for gold ore to Coptos, and recorded the event as follows: "To bring gold ore I sailed south to the city of Coptos, together with the hereditary prince, commander of the city and vizier, Sesostris. I sailed south with 600 from the bravest of the Oryx nome. I returned in safety, my soldiers having suffered no loss: I accomplished all that had been commanded me."

In both of these cases, it will be noted that the expedition went after and brought back gold ore, rather than refined gold.

After the Nomadic kings had been driven out of Egypt, and the New Empire of Thebes established, about 3,500 years ago, an invention was made which greatly facilitated smelting. This was the application of foot power to the bellows. This bellows consisted of a goat skin, with a tube leading from it to the fire. The illustration shows the workmen standing with each foot on a skin. By resting his weight on one foot, he drives the air from that bellows into the fire, while by lifting the other skin with a cord he causes it to be filled with air. This was a great improvement over the old blow pipe, and made it possible for the Egyptians to smelt more refractory ores, and in much greater amounts.

In this period bronze became common, though tin for it had to be imported mostly through the Phoenicians. Iron also came into more frequent use, though it was never employed by the Egyptians as much as bronze.

The gold mines of Atika were situated far across the burning desert, and the expeditions were greatly hampered by the absence of water. When Seti I inspected the mines from which electrum was brought, he sorrowed over the lack of water on the way, and caused a well to be dug, which for a time was a great aid to the expeditions. Later this well dried up, and another

Ancient Egyptian quarryings in a mine in Sinai

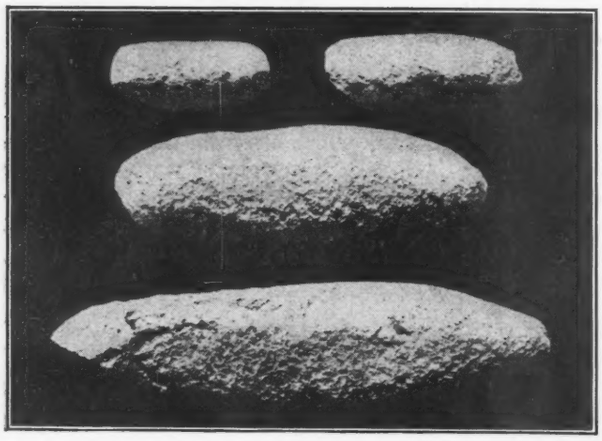
one was excavated on the road to Akita by Rameses II in the Nineteenth Dynasty.

A remarkable papyrus of that period contains perhaps the oldest plan of a mine in existence. It represents two valleys running parallel to each other between the mountains, and united by a winding valley which crosses them. The pointed mountain marked "A" has the notation, "Mountains where gold is washed," while on the mountain marked "B" are the words "gold

Stone pillars left in mine in Sinai

mine." The valley "M" and the pass "N" are called routes to the sea. On the mountain marked "C" was a temple of Amon. The huts marked "H" no doubt belonged to the gold miners, while the reservoir marked "K" was probably the well of King Seti I.

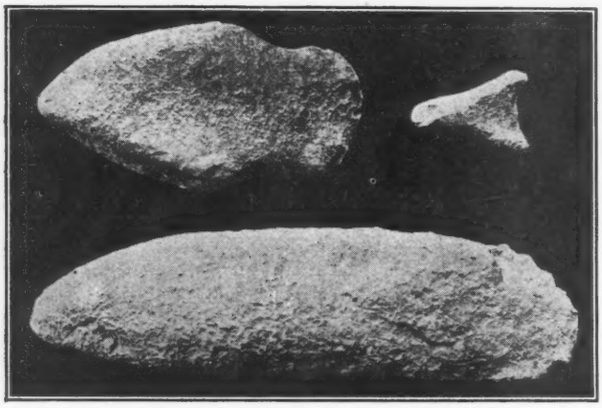
In the next dynasty we read of a great expedition sent by Rameses III to the copper mines in Atika: "I dispatched my forces to the land of Atika, to the great copper mines there. Some we carried by galleys, while others went by land upon their asses. The



Stone pounders for crushing stone, from Sinai

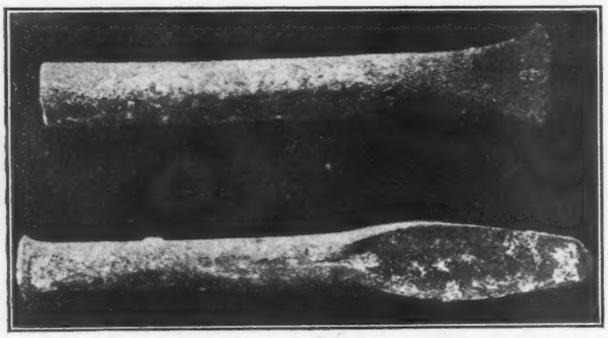
like had not been heard of before since the first kings. The mines were found rich with copper. It was loaded by myriads into the galleys, which were sent on to Egypt and arrived in safety. The bars of copper were brought and piled into a heap under the balcony, a hundred thousand in number."

A similar expedition was sent by Rameses III to the turquoise mines of Sinai, and brought back genuine turquoise in numerous sacks, as well as silver and gold.



Stone picks from Sinai

In his researches in Sinai, Petrie found stone picks, pounders, mallets and hammers, as well as flint scrapers for grubbing out the sandstone. A highly interesting relic was a crucible of pottery in the shape of a hemisphere with the rim rising vertically still higher, and the spout considerably below the rim. It is thought that the handle of this was not strong enough to bear the weight of molten metal, and that it was emptied by being rolled rather than lifted.



Copper chisels for mining, from Sinai

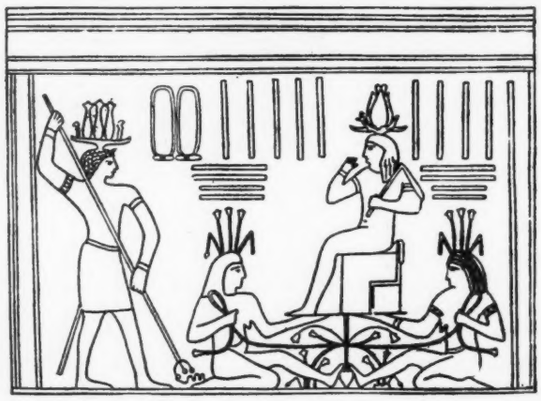
At the bottom of some of the many huts were buried household utensils of stone or pottery which were too heavy in proportion to their value to be carried back to Egypt, and were hidden by the last occupant of the hut on the chance that he might return.

A thousand years later, after Egypt had been conquered by Alexander, and was under the rule of the Ptolemies, which, it must be remembered, was a Greek

A pottery crucible for copper, from Sinai

dynasty, the old Egyptian system of working the mines through expeditions was changed. The mines were put under close control, and were worked by criminals whose offences were great enough to be punished by life imprisonment. In many cases even their families were banished to the mines with them, and also forced to wear their lives out at the work.

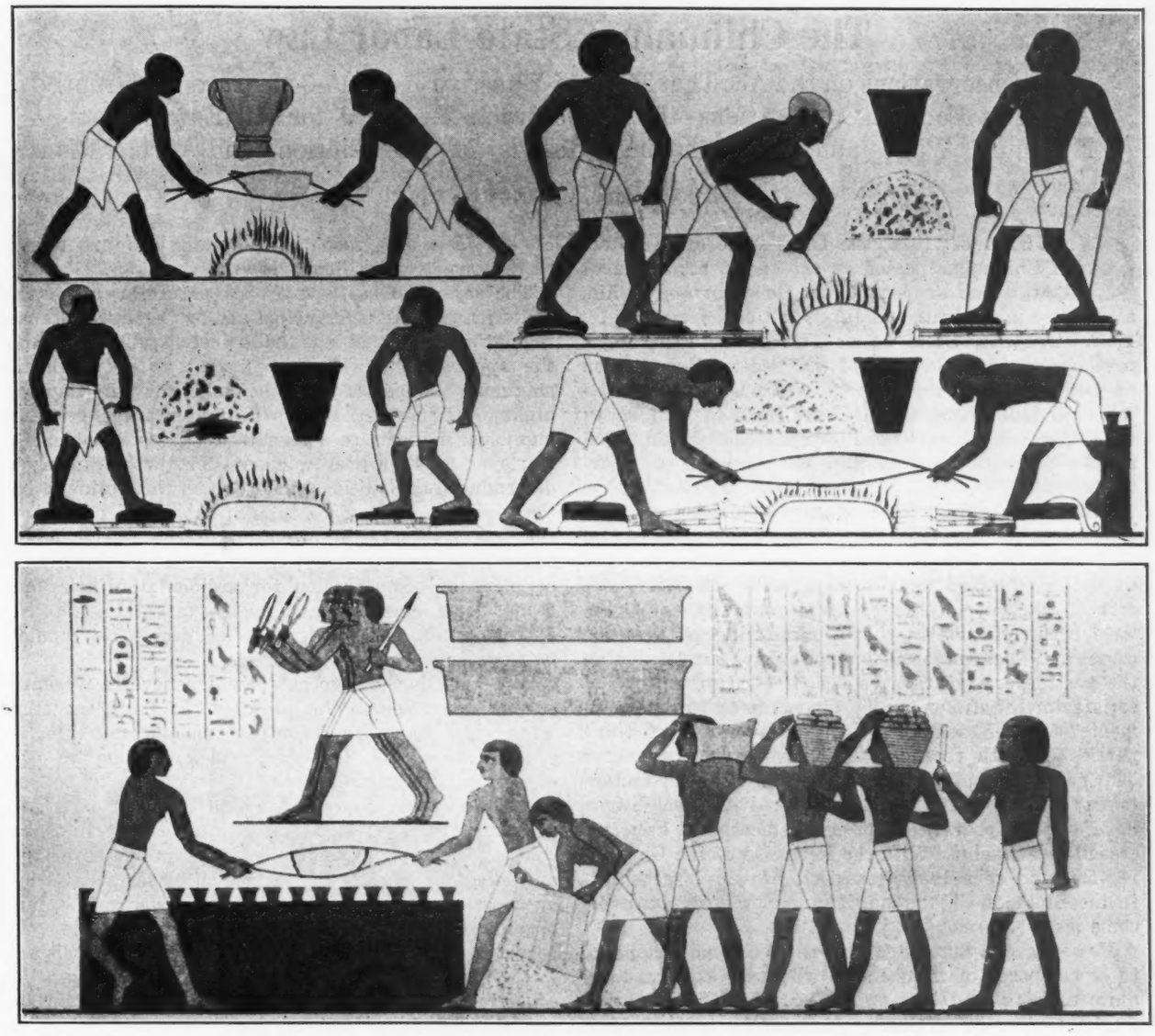
The mines were visited by Diodorus Siculus in the



Rock drilling in Egypt 3,500 years ago. Note the position of the workmen and the prod of the foreman

first century B. C., and he gives something of an account of the methods in use.

The soil was naturally black, but in the body of the earth ran many veins shining with white marble and glistening with all sorts of bright metals. There was one overseer for the whole work, who marked out the stone and showed the laborers what to do. The rock which was the hardest and full of gold was softened by putting fire under it, and then worked out with the



Smelting with the foot bellows and casting, Eighteenth Dynasty

hands. Several thousand wretches followed the vein, and broke it in pieces with hammers and iron pick axes. They carried lamps fastened to their foreheads to give them light, but otherwise worked in perfect darkness. The pieces of stone were thrown out upon the floor of the gallery, where they were gathered up by little boys and carried out.

Other criminals who were about thirty years of age took this rock and pounded it with iron pestles in stone mortars until the pieces were about the size of a bean. The older men and women then placed them in mills and ground them until they were as fine as meal. Finally the masters of the work took the powdered stone and spread it upon a broad and slightly hollowed plank where they washed and cleansed away the earth, the gold, on account of its weight, remaining behind. After washing it several times, they drew out the remaining dross by delicately applying slender sponges. Finally, other workmen put it into earthen jars, and, in proportion to the quantity, mixed with it "some lead, grains of salt, a little tin, and barley bran." Covering the pots very tightly, and daubing them over with clay, the men placed them in a furnace and left them there five days and nights, after which, assures Diodorus, only pure refined gold remained.

To be continued.

Precipitating Copper by the Bardt Process

A South American correspondent mentions the precipitation of copper from acid or neutral solutions by a process invented by a Mr. Bardt, a German engineer living in Chile. Pure copper is precipitated by the *polissaccaratos* present in wood, one part of sawdust precipitating one part of copper. The sulphuric acid used is regenerated. The process is conducted in autoclaves at 140 deg. C., at a pressure of 70 lb. more or less. At Copiapó, Chile, there is said to be under construction a leaching plant to treat 600 tons per day by this process. Our correspondent also mentions another patent issued to Mr. Bardt by which unroasted copper sulphides are leached with sulphuric acid and a little saltpeter in autoclaves at about 140 deg. C. The nitric acid produced is regenerated.

So far as we know, neither of these processes has been tried in this country.

The Chihuahua State Labor Law

Some Observations on the Act That Became Effective Aug. 15—Measure Apparently Aimed at Foreign Corporations—Labor Contracts Required for All Employment—Minimum Wage and Proft-Sharing—Boards of Conciliation and Arbitration

BY A SPECIAL CORRESPONDENT

ON JUNE 27, 1922, the Legislature of the State of Chihuahua passed an act known as the Labor Law, which was sent to the Governor and by him signed and promulgated on July 5 to take effect Aug. 15, 1922. The new State Labor Law is the result of a prescription in Article 123 of the Federal Constitution of 1917 which obligates each state to make laws regulating labor and social-welfare conditions in conformity with the principles expressed in that same constitutional article, but with due regard to the needs of each particular state.

Other than a possible moderate regulation of compensations for accidents, the State of Chihuahua had little or no need for such legislation, especially so far as the mining and metallurgical industries were concerned. Relations between employers and employees have been amicable in the overwhelming majority of cases, and such minor disputes as have arisen during the past several years have been settled promptly and satisfactorily between and by the workmen and managements themselves without the intervention of third parties or with recourse to serious strikes or other demonstrations. Labor has been well paid, all factors taken carefully into consideration; living conditions have been improving; and employment has been increasing gradually. With the initiation of the Obregon regime, and consequent cessation of bandit activities in the State of Chihuahua, life and property have become more secure.

However, the State Legislature in the main appears to be composed of members to whom radical ideas are quite alluring, and they were determined to upset the existing order of affairs by giving trial to something new in the state, even in the face of the fact that President Obregon had previously caused to be published a project for a federal enactment regulating Article 123 of the Constitution, which he intends to present for consideration this fall to the newly elected Federal Congress and in the preamble of which project the President stated that "lately a large part of the legislators have taken as a basis for their legislation their own personal political ambitions, promoting reforms which please the majority of the working classes by their theoretically legal aspect, but which also please the capitalistic class on account of their complicated application by which these same laws offer facilities for their evasion."

FOREIGN CORPORATIONS OBVIOUSLY THE TARGET

The principal industry in Chihuahua today is that of mining and its allied processes, in which by far the larger part of the hired labor of the state is employed. And the vast majority of the labor used in the mining industry in the state serves foreign corporations or Mexican corporations controlled by foreign capital and directed by foreign executives. Without comment on the aim of the law or that of the legislators who devised and effected it, it is very easy, as a consequence of the foregoing facts, to perceive who are offered as the target which finally is hit.

The objects of the new law are carefully enumerated in its first chapter. Principal among them are to enact regulations establishing the principle and governing the application of labor contracts; to establish the maximum number of working hours for both day and night work; to establish a minimum wage for each municipal district; to designate the cases in which the employer must provide quarters for the workmen; to determine the conditions under which the workman has the right to participate in his employer's profits; to regulate free medical attention to the workmen and to establish safety rules; to establish and insure the payment of compensation for accidental injuries and occupational diseases; and finally, to establish courts of conciliation and arbitration to decide on conflicts between employers and employees.

As established by the new law, whenever a workman performs any service for an employer for a monetary wage (and all other forms of remuneration are expressly forbidden), the conditions governing the class of service, the place where the service is to be performed, working hours, wage and duration of service must be expressed in a "labor contract." This labor contract may be arranged between an employer and an individual offering his service on either a day's pay or a task basis, or between an employer and a duly organized and state-recognized labor union for the services of several of its members, thus establishing in the state the principle of collective bargaining. The collective contract must be in writing and in duplicate, but the individual contract may be either verbal or written, provided that the verbal contract can be attested by two witnesses and again provided that the employer has not in his service 100 workmen. If he has more, he must make written contracts with all men engaged on permanent work, but is allowed the privilege of verbal contracts with those employed on temporary work, while to each of these he must issue every two weeks a written acknowledgment of the amount of time worked and wages received.

The intent of the law is to drive the employer to the use of written contracts with his workmen. Privileges and penalties are inscribed to this end. These written contracts, to become fully legal, must carry the duly cancelled stamps required by the Federal Stamp Law, an added burden to those larger concerns having a heavy labor turnover. The workman incurs no further penalty for breaking the contract than his responsibility as established by the civil law, recourse to which could bring but small satisfaction to the employer, even in the remote case that he received a judgment, whereas the employer is subject not only to the civil law but also to special fines and penalties imposed by the Labor Law itself.

Imagine, if you will, the discomfort of the night foreman of a large metallurgical establishment on dis-

covering that fifty men had not reported for work (a not unusual occurrence when handling large quantities of unskilled labor) and another fifty are at the gate seeking employment. While the plant suffers for lack of attention, because of the law's requirements further delay must be occasioned by the formality of making a contract with each individual applicant—a contract which each new man can break the following day with impunity.

The Chihuahua Labor Law, following constitutional precept, establishes an eight-hour day and a seven-hour night shift, as maximums. However, this is not a matter to occasion apprehension, in view of the fact that in writing the regulation a point in the existing Sonora Labor Law was copied, requiring that the stated number of working hours on either shift be *effective* hours. Observant superintendents and managers will have noted the benefits introduced by this one word.

Municipal Committees to Fix Minimum Wage

The law provides for the establishment every year, in each municipality of the state, of a Committee on Minimum Salary and Profit Sharing. This committee will be composed of one representative each of employers and employees in every existing industry in the municipality, together with one alderman chosen by the municipal council, who will act as chairman of the committee and therefore will cast the deciding vote in case of a tie. As the remuneration of the committeemen is to be provided by the bodies or individuals nominating them, quite naturally one-half of the committee will invariably favor the workmen, the other half the employers, and tie votes will be the rule rather than the exception. The attitude of the presiding alderman will be the subject of much speculation and interest.

This committee will have its ordinary sessions during January, and can be brought into extraordinary session at any other time during the year on the call of one or more employers or of more than fifty workmen, or by the order of the State Board of Conciliation and Arbitration, to which it is subordinate. After giving due consideration to the necessities of its particular municipal district and to the data affecting the subject, offered by the various employers and employees concerned, it shall fix by a majority of votes the minimum wage for that particular municipality, to remain effective until revised by the same committee or its successor, and woe betide the employer who violates its ruling.

Furthermore, this same committee will rule on the amount of profit-sharing to be enjoyed by the workmen of each enterprise, provided that the amount has not been agreed upon previously between employer and employee *in a written labor contract*, or in case the employer can establish the fact that during the previous calendar year he has not enjoyed a net return on his capital greater than 20 per cent, which is allowed for interest and depreciation, when, upon duly approved application, he is exempted from participation. Ingenuously, the law makes no attempt to define "capital."

Both principles of minimum salary fixation and profit-sharing are economically wrong. Though labor is an item in productive industry too human to be classified as a mere commodity, fortunately or unfortunately it responds to the chief economic law affecting the price of commodities, that of demand and supply, and no mere commission can hope to upset that law by the imposition of arbitrary wage scales without tending toward economic disaster. The precept that labor should participate in the profits of an enterprise is based on the false premise that the brawn of the laborer rather than the brain of the executive is responsible for financial success. Had the Chihuahua legislators contented themselves with an effort to establish bonuses for workmen based on faithful and continuous service, they would have been attempting a real benefit for the working classes, whereas their enactment embodying the false principle of profit-sharing can lead only to the evasions foreseen by President Obregon.

Living Quarters at Low Rentals Must Be Provided

Clause II of Article 30 of the Chihuahua Labor Law is but a reiteration of a clause in the Federal Constitution which provides that the employer is obligated, when his works are located outside of municipal limits, to provide his employees with hygienic and commodious habitations at a monthly rental not to exceed one-half of 1 per cent of the *assessed* valuation of the property; but, moreover, provided that more than 100 workmen are in an establishment situated within the corporate limits of a municipality, the same obligation holds.

For several years, recognizing the greater efficiency resulting from the elimination of discomforts, the larger operating mining concerns in the State of Chihuahua have been tending toward better housing of their more humble employees, but always with the accompanying idea of a fair return on such investments. The law prohibiting the collection of monthly rentals exceeding one-half of 1 per cent on the assessed value of the property (averaging probably about 40 per cent of the investment) has the effect of a state-imposed wage increase, together with the enforced investment of further capital in a non-productive field. Those few more unfortunate mining concerns whose operations are situated within the incorporated cities, together with the larger urban industrial concerns employing over 100 men, are indeed hard hit. Either they must purchase expensive city real estate and erect thereon the required habitations, or, as the law simply states that the employer must *provide*, not necessarily erect, suitable habitations, they may lease such houses and sublease to their employees. In the first case, the law works a grave injustice to the existing landlords by reason of rental reductions to a point below that of the return necessary to make repairs, meet taxes, and provide a fair interest on capital invested, while the alternative offers these same landlords an opportunity to "bleed" the employers.

Accident Compensation Provisions Defective

The regulation of free medical attention to the employees, which also provides that the applicant for employment must subject himself to a physical examination if required, cannot appear particularly onerous to the fair-minded employer; the establishment of sanitary measures and safety rules around the works is more generally desired by the executives than by the workmen; and the innovation of a schedule rating moderate compensations for accidents and occupational diseases will be no more injurious to mining enterprise in Chihuahua than it has been in other states and countries where effective. But the ruling governing compensation payments is somewhat obscure, and no

provision is made to secure the benefits from spendthrift tendencies and wasteful extravagance.

Graded both according to the employer's capital and the number of men he employs, the law establishes a compensation tariff of definite indemnities payable according to the apparent intent of the law, in a lump sum. As the working classes of the state are, on the whole, totally ignorant of the uses of money in other than very small amounts, it is only too evident that a death compensation of 150 weeks' wage may be squandered wastefully and fruitlessly by an uneducated and inexperienced widow beneficiary and entirely without benefit to surviving minor children. Such compensation payments simply will be money thrown away. Only a people trained to saving can be entrusted to use properly a sum of money exceeding their customary current requirements, and the absence of the saving habit in the Mexican working classes is notorious.

Boards of Arbitration To Be Established

The idea of conciliation and arbitration of disputes between employer and employee by an outside party is pretty in principle but difficult in application. The law provides that to consider each and every such separate dispute there shall be established in each municipalty[1] a special Board of Conciliation composed of five members, two nominated by the workman or workmen involved, two by the employer, and, to preside, an alderman appointed by the municipal council. Their tenure of office is only for the period of the consideration of the dispute in question, which must not occupy more than three daily sessions. These municipal Boards of Conciliation are simply what their name implies, and no more, in that they possess no juridical powers and act only in an endeavor to persuade the disputants to reach an amicable solution of the trouble without further recourse to law. If this happy ending of the dispute is not attained, the case is referred to the State Central Board of Conciliation and Arbitration, which, acting not as a "court of right," will arrive at its finding according to the dictates of equity and its own conscience. The Central Board has the power to assess heavy fines and to lay heavy penalties.

All Industry Made Subject to Governor's Will

This State Central Board, a permanent organization, will be composed of three members named by the labor unions in the state, three by the Chambers of Commerce, Agriculture and Industry, and will be presided over by a seventh member named by the Governor of the state. The members of this body also receive their remunerations from the societies nominating them, so again we shall find a divided tie vote on all important matters which may finally be decided by the vote of the Governor's appointee, thereby calling in political, not trained judicial, aid to solve problems of grave economic importance to the state. And amplifying this faculty given the reigning political power, the law provides that the Governor himself, when he so desires, may substitute for his own appointee and preside at the meetings of the Central Board. In other words, *the entire industry of the state is subjected to the will of its Chief Executive.* While fortunately the probity and honesty of purpose of the present incumbent are unimpeachable, no one can vouch for the future, and the scarcely veiled menace of taking the control of industry out of the hands of those to whom that control rightfully belongs by reason of their investment cannot aid the state to rehabilitation and future prosperity. If no other reason existed, this alone should be sufficient to cause the prospective investor of new capital to hesitate sufficiently to recall the age-old Roman warning *"caveat emptor."*

Violence by Minority of Strikers Tolerated

A constitutionally inspired article of the Labor Law, in the chapter covering strikes and lock-outs, resents in the chapter covering strikes and lockouts, presents licit strike, states that it shall be considered as such provided that it is initiated, developed, and terminated without physical violence on the part of the *majority* of the strikers. To illustrate this, during a strike at a property employing say 100 men, fifty of them may commit depredations involving the total destruction of the property, and they may commit acts of personal violence against the management and the staff, even including murder, but still the status of the strike remains licit. Let the fifty-first employee join in the acts of violence, and automatically the strike becomes illegal, but, even so, the law makes no effort to protect or assist the employer during an illicit strike other than to offer indirectly to him the doubtful advantage of employing those others to fill the strikers' places whom he is expressly forbidden to employ as long as the strike retains a legal aspect.

Many Features of New Law Excellent

Though the law contains much that is markedly prejudicial to the employers, there still remains the possibility that mining operations can continue under it. Many of its features regulating hygienic and safety rules are admirable. Undoubtedly the older established mining concerns now operating are going to continue as long as tolerantly possible, if only in an effort to protect and salvage existing investments. But the incentive to risk new capital in new enterprise has been stifled.

Much depends on the attitude of the working classes once the law is in force, and this attitude, with its changes, must become the concern of the industrial patrons and by them to be subjected to close surveillance and analysis. Up to very recently the State of Chihuahua has been singularly free of violent socialism and the exposition of bolshevik doctrines. Yet only as recently as Aug. 1, two weeks before the date of effectiveness of the new law, for the first time, in two of the largest cities of the state, the red and black flag was unfurled at the head of large manifestations. The sign is ominous.

[1]In the State of Chihuahua municipal authorities function over an area beyond the strict corporate limits of their own town or city. Thus, a large township, several distinct ranches, hamlets and villages, and a city may together comprise a single municipality. Several of these municipalities are grouped to form one of the several political "districts" corresponding to counties, into which the state is divided.

Slag for Roadbuilding

The Electrolytic Refining & Smelting Co., at Port Kembla, New South Wales, has erected a crushing plant for the treatment of copper slag for road construction and the manufacture of concrete, according to *Commerce Reports;* and the Hurstville Municipal Council has agreed to take delivery of at least 18,000 tons a year. It is considered that this undertaking will pay for itself in the first year.

Metallurgists of Note

E. A. WRAIGHT

BORN in 1879, E. A. Wraight was educated at the old Elizabethan foundation of St. Olave's Grammar School. The facility with which he gained no less than seven consecutive scholarships during his school days gave promise, afterward amply fulfilled, of a distinguished academic career. Originally intended for the medical profession, he entered the Royal College of Science with a national scholarship for biology in 1899, but being attracted to things metallurgical, he transferred his studies to the Royal School of Mines, where he was graduated (under the late Sir William Robert Austen), with considerable distinction in metallurgy in 1902. On obtaining his diploma he was awarded a research scholarship and subsequently appointed junior demonstrator in metallurgy, after having been engaged for a short period in the Indian Government laboratories at the Royal Indian Engineering College. In 1903, he held the temporary appointment of assistant assayer at the Royal Mint, and during that year was appointed senior demonstrator in metallurgy and assaying at the Royal School of Mines. During his tenure of this appointment, 1903-1914, he attained the greatest popularity with his students, firstly through his original but highly effective methods of instruction, and secondly by the great interest he took in all social events and sports, in all of which he was a brilliant and active participator. The affection with which he was regarded is best shown by the nicknames he acquired. At school he was "Professor," while to the writer and to nearly every student he was "Father."

E. A. WRAIGHT

Throughout his career at the Royal School of Mines he devoted considerable time to research, and was awarded the Edward Matthey prize for original investigations and was one of the early Carnegie Scholars, holding scholarships from the Iron & Steel Institute during 1904, 1905, and 1906. The problem of treating complex ores was one of his hobbies and he advised many mining concerns on this and kindred problems. His love for his work and his students was such that he refused many lucrative appointments offered him in various parts of the world. Incidentally, it may be mentioned that he was one of the youngest men ever to be elected to full membership of the Institution of Mining and Metallurgy.

His services were refused for active service during the early months of the war, but in December, 1914, he became acting paymaster to the Royal Engineers, and in 1915, supervising paymaster to the Royal Defence Corps when that corps was formed, being subsequently transferred in 1916 to the Aeronautical Inspection Department and commissioned as lieutenant. He rendered valuable services to the Air Ministry, especially in connection with the production and heat treatment of special alloy steels for aircraft and engine construction, and rose finally to the rank of officer-in-charge, inspection of iron, steel and non-ferrous metals (Royal Air Force). He eventually resigned in 1920, although offered a permanent appointment. Mr. Wraight has been a most prolific investigator, and among the better known of his researches (non-ferrous) are his investigations on cyanide solutions, complex lead, zinc, copper, and gold ores, and tin assaying.

As a writer Mr. Wraight has achieved no small measure of success; his textbook on assaying has been rightly described as "the most useful and practical volume on this subject." He is also the author of many papers read before various societies or published in the scientific press. Among his numerous publications are: "The Segregation of Silver in Argentiferous Copper," "The Decarbonization of Ferromanganese," "The Preparation of Carbon-Free Ferromanganese," "The Pearce Low Assay of Tin," "The Effect of Heat on Cyaniding Gold Ores," and "The Heat Treatment of Chrome-Vanadium Steel." His most recent papers, "The Standardization of Materials Employed in Mining and Metallurgy" and "The Heat Treatment of Drill Steels," have aroused a vast amount of interest and discussion throughout England and the United States.

Mr. Wraight is at present temporarily engaged with a syndicate that is breaking down all surplus ammunition accumulated by the British government.

CONSULTATION

Buyers of Radio Crystals

"Will you kindly supply me with a list of companies in the market for mineral crystals for radio telephone receiving sets?"

No complete list has been compiled, but the following firms manufacture and sell crystal detectors, and are therefore no doubt in the market for suitable crystals. The names of others could no doubt be culled from the advertising pages of the radio magazines.

Pacific Coast Radio Manufacturing Co.....Seattle, Wash.
Martin-Hewitt Laboratory,
3199 Bainbridge Ave., Bronx, New York City
Radio Corporation of America.....64 Broad St., New York City
Local Sales Co. of New York, Inc.,
12 East 42d St., New York City
American Electro-Technical Appliance Co.,
227 Fulton St., New York City
General Radio Co.....Cambridge 39, Mass.
Clemence & Enderle .....Irvington, N. J.
Wiener Wireless Specialty Co.....21 Academy St., Newark, N. J.
Arjay Radio Products .....Elizabeth, N. J.
De Forest Radio Tel. & Tel. Co.....Jersey City, N. J.
Lalley Radio Corporation .....Detroit, Mich.
Riley-Klotz Manufacturing Co., Inc.,
17-19 Mulberry St., Newark, N. J.
Pacent Electric Co., Inc:.....150 Nassau St., New York City
Savoy Manufacturing Co.....115 East 24th St., New York City
International Radio Corporation,
44 Branford Place, Newark, N. J.
General Radio Manufacturing Co. ..East Liberty, Pittsburgh, Pa.
Crosley Manufacturing Co.....Cincinnati, Ohio
Lawson Electric Co. .....Brooklyn, N. Y.
Audiola Radio Co.....432 S. Green St., Chicago, Ill.
Rocky Mountain Radio Products, Inc.,
9 Church St., New York City
C. D. Tuska Co.....6 Bartholomew Ave., Hartford, Conn.
Colin B. Kennedy Co.....San Francisco, Cal.
Adams-Morgan Co.....Upper Montclair, N. J.
American Radio & Research Corporation
207 College Ave., Medford Hillside, Mass.
Frank A. D. Andrea.....1882 Jerome Ave., New York City
R. W. Bliss Co.,.....139 Hollis Ave., Atlantic, Mass.
Bronx Radio Equipment Co.,..687 Courtlandt Ave., New York City
J. H. Bunnell & Co.....32 Park Place, New York City
Cino Radio Manufacturing Co...218 W. 12th St., Cincinnati, Ohio
Clapp Eastham Co. .....139 Main St., Cambridge, Mass.
Wm. B. Duck Co.....224 Superior St., Toledo, Ohio
Federal Tel. & Tel. Co.....1738 Elmwood Ave., Buffalo, N. Y.
Galena Crystal Manufacturing Co.
464 Bushwick Ave., Brooklyn, N. Y.
General Electric Co.....Schenectady, N. Y.
A. H. Grebe & Co. 70 Van Wyck Blvd., Richmond Hill, New York
Hi-Grade Wireless Instrument Co.....Asheville, N. C.
Joy & Kelsey.....4021 W. Kinzie St., Chicago, Ill.
Klitzen Radio Manufacturing Co.....Racine, Wis.
Lawsam Electrical Co.....122 Fifth Ave., New York City
Manhattan Electrical Supply Co.....17 Park Place, New York City
Wm. J. Murdock Co.....Chelsea, Mass.
Newman-Stern Co.....Cleveland, Ohio
Parkin Manufacturing Co.....Grand Ave., San Rafael, Cal.
Pennsylvania Wireless Manufacturing Co.....New Castle, Pa.
The Radiomart Co.....1236 American Ave., Long Beach, Cal.
Signal Electric Manufacturing Co.....Menominee, Mich.
Star Manufacturing Co.....Newark, N. J.
Telephone Maintenance Co., Dept. C., 20 S. Wells St., Chicago, Ill.
Tresco.....Davenport, Iowa
Westfield Machine Co.....Westfield, Mass.
Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
The Wilcox Laboratories, Inc.....Lansing, Mich.
Wireless Equipment Co., Inc.....32 Austin St., Newark, N. J.
Wireless Improvement Co.....66 York St., Jersey City, N. J.
Wireless Specialty Apparatus Co.
76 Atherton St., Jamaica Plain, Boston, Mass.

Tripoli and Diatomaceous Earth

"I would like to know the difference between tripoli, such as is found in the middle west, and diatomaceous earth. What tests may be used to distinguish the two non-metallics? What uses have been developed for tripoli?"

Tripoli is a rock derived from the decomposition of siliceous limestone. When pure it is white, loosely coherent and although it may be crumbled in the hand its individual grains are hard enough to scratch steel.

Tripoli is frequently confused with diatomaceous or infusorial earth, which resemble each other physically and chemically. Diatomaceous earth is made up of the siliceous skeletons of diatoms or minute organisms living in water. It is usually white and porous and contains from 5 to 10 per cent combined water.

Tripoli may be distinguished from diatomaceous earth by means of several tests, according to R. B. Ladoo. Pure diatomaceous earth has ordinarily a specific gravity less than one and will therefore float on water. Tripoli is usually heavier than water and will sink. The most conclusive test can be made with the microscope under whose high-powered objective tripoli appears as more or less well-rounded grains whereas diatomaceous or infusorial earth shows the diatoms which compose it. The test should be made on the pulverized material moistened with water. An analysis of pure white tripoli will generally show over 95 per cent silica, whereas a pure white infusorial earth will usually show less than 90 per cent silica. The individual grains of tripoli are solid; the grains of diatomaceous earth are hollow.

Massive tripoli is used in the manufacture of filters mainly for use in homes where a municipal filtering system is not available. Gooch crucibles for use in analytical work have also been manufactured from tripoli. The ground material has several uses. As an abrasive, ground tripoli is used for polishing and buffing and as an ingredient in scouring soaps. Large amounts of ground tripoli are used in the manufacture of scouring soaps. A recent development is its use as a parting sand in foundry work. Another important use is its consumption in paint fillers and in rubber manufacture, and also as a filler.

The Deepest Mine Shafts

"It was reported in our local paper that gold ore was struck in Colorado Springs that would assay $20,000 a ton at a depth of 26,000 ft. Could you give me the depth of the Portland mine at Victor, Col.? Also what are the deepest mines in the world?"

Although it is not uncommon to have an ore sample assay $20,000 per ton in gold, a depth of 26,000 ft. is far beyond anything attained in mining or drilling. The item probably referred to a depth of 2,600 ft.

The deepest mine in the world is that of the St. John Del Rey Mining Co., Ltd. at Morro Velho, Brazil, which has reached a vertical depth of 6,426 ft. below the surface. This great depth is not attained by one shaft but by a series of five, staggered to follow the 45-deg. pitch of the lode and connected by crosscuts. At the Ooregum mine, in India, a depth of over 5,400 ft. has been reached. In the United States, Tamarack No. 3 shaft of the Calumet & Hecla Mining Co., in northern Michigan, is one mile deep vertically. The Kennedy gold mine on the Mother Lode in California has a vertical depth of over 4,000 ft. On the Rand, in South Africa, several shafts are over 5,000 ft. deep, and one mine, the City Deep, is planning to sink to 7,000 ft.

THE PETROLEUM INDUSTRY

Causes of Recent Large Increase in Accumulation of Oil

Secretary Welch, of American Petroleum Institute, Expresses Opinion in Testifying Before Subcommittee of Senate

SINCE Nov. 1, 1921, to date the oil industry has been producing and importing more oil than was consumed in this country, or exported, said R. L. Welch, secretary of the American Petroleum Institute, in his recent testimony before a Senate subcommittee in connection with the petroleum inquiry. The excess of the production and imports of all classes of petroleum and its products over the domestic consumption and exports has been as follows:

	Barrels
1921	
November	4,198,953
December	7,911,774
1922	
January	17,304,208
February	7,241,996
March	12,038,871
April	14,389,815
May	7,217,061
Total	70,302,678

The official figures for June and July are not yet available, stated Mr. Welch, but it is known that pipeline and tank-farm crude-oil stocks in June increased 7,091,000 bbl. and that the domestic production of oil in July was approximately 1,480,000 bbl. per day, or at the highest rate that actual production has ever run in the history of the oil business. The complete official figures will doubtless show an excess of production and imports over consumption and exports for the months of June and July. There has never been any such accumulation of oil in the same length of time at any period in the history of the oil business.

"Therefore, looking at the situation during the last eight months from a purely statistical point of view, and not taking into consideration elements of uncertainty as to domestic and foreign production and as to the consumption of oil," said Mr. Welch, "it would seem necessary to point out what reasons, if any, there were that kept [the price of] crude oil from declining sooner. . . . There are certain facts of common knowledge which doubtless affected the judgment of purchasers in their belief that it was a safe speculative risk to buy and store crude oil at the prices heretofore prevailing. The most profound factor was apprehension that the production in Mexico would rapidly decline."

The imports of oil into the United States, 1918 to 1921, practically all of which came from Mexico, were as follows: 1918, 38,943,635 bbl.; 1919, 54,161,218 bbl.; 1920, 108,793,837 bbl.; and 1921, 128,733,051 bbl. Imports for the first six months of 1922 were about 79,000,000 bbl., or at the annual rate of 158,000,000 bbl.

The foregoing, stated Mr. Welch, indicates a phenomenal rise in the importations of oil from Mexico. Yet there was apprehension founded upon the well-known character of Mexican oil wells. Their character was appropriately described by Frederic R. Kellogg, counsel for the Mexican Petroleum Co., in a speech delivered in November, 1920, as follows:

"The oil in Mexico is found under entirely different conditions than those which commonly prevail in the United States. I believe there is no sand—in our use of that term—in any of the oil fields that are now producing; . . . for these giant wells came in with capacities of 100,000, 200,000, or 300,000 bbl. a day, under a combination of water pressure and gas pressure running as high as 1,085 lb. to the square inch, and they would have run wild unless they were controlled. But to get the desired production from them while under control a certain opening of the valve is indispensable. . . . These wells are born in the full virility of their gigantic powers. They live like giants, straining at the chains that bind them, and they die as giants should, stricken as by a thunderbolt."

"The question in the oil industry," said Mr. Welch, "has been how many wells in Mexico were going to be stricken as with a thunderbolt.

"It is important for the witness to state, in the most emphatic language, at this time, that he does not claim to know what the future production of Mexico will be nor what companies own producing wells. It is the opinion of the witness, however, that the Mexican Petroleum Co. has many thousands of acres of undeveloped oil lands and that that company will continue to produce in the future large quantities of oil, but the witness would not venture even a guess as to when this oil would be brought forth or in what quantities."

It was pointed out by Mr. Welch that recent occurrences reported in the press indicated a falling off in the production of the Toteco-Cerro-Azul pool and that the apprehensions of impending exhaustion that had been expressed were justified.

Many oil men also questioned, stated the witness, whether the domestic production of oil would be at a high enough rate to meet the requirements of domestic consumption and exports if Mexican production fell off as was expected. However, the development of a series of important pools, both in the mid-continent field and in California, with the resultant large flush production, has increased the current supply to a point where, in connection with the stocks on hand, there is no longer any immediate need for apprehension regarding a sufficient supply to meet present demands.

There has been a phenomenal increase in the production of Oklahoma, according to Mr. Welch. The daily average production of Oklahoma in 1921 was about 317,000 bbl.; for January, 1922, it was about 323,000 bbl. However, by May, production had jumped to 381,000 bbl. It was at about the same rate in June and in July, averaging about 405,000 bbl. per day.

Mr. Welch expressed the opinion that, in view of the fact that during the last few years the oil industry has developed a large number of new and highly prolific pools, which will now decline, the continuity of the supply will seemingly be largely dependent upon the discovery and development of new extensive oil fields

Mexican Export Taxes on Oil Cut 60 Per Cent

Total, Including That on Production, Now 22c. Per Barrel of Crude, Compared With 34c. Formerly

THE Mexican Government has officially decreed that the export taxes on oil be reduced to 40 per cent of the former rate established in June, 1921, this report having been confirmed by the Mexican Financial Agency in New York. The reduction in taxes is understood to be retroactive to Feb. 1, and was put into effect under a presidential decree signed Aug. 17 and published in Mexico City on Aug. 18. This decree is said to be part of the agreement reached in this city in June between Adolfo de la Huerta, as representative of the Mexican Government, and bankers and officials representing the American oil companies in Mexico. A total of approximately $2,000,000 monthly is expected to be raised by the Mexican Government as a result of the new rate of taxes, which, it is understood, will be used in paying off the external debt of the Mexican Government.

The full text of this plan to liquidate the external debt was to be made public on Sept. 1, with the opening of the Mexican congress.

The following table shows the old and new rates of taxes on various grades of crude and refined oil, the old rates being those put into effect under the decree of June 7, 1921, the rates being based upon a cubic meter, equal to 6.9 barrels of oil:

	Old Rate	New Rate
Crude oil, specific gravity 0.96 or less	$1.25	$0.50
Crude oil, specific gravity 0.96 plus	.72	.31
Fuel oil	1.00	.40
Gas oil	2.32	.92
Crude gasoline	4.70	1.88
Refined gasoline	2.35	.94
Crude kerosene	1.50	.60
Refined kerosene	.75	.36
Lubricants	1.40	.56

On the basis of a single barrel the tax on heavy crude oil amounts to 8 cents; on crude 0.96 plus, 5 cents; fuel oil, 6 cents; gas oil, 14.6 cents; crude gasoline, 29.8 cents; refined gasoline, 14.9 cents; crude kerosene, 9.5 cents; refined kerosene, 4.7 cents, and lubricants, 8.9 cents. The production tax on crude remains unchanged at 14 cents a barrel, so that the total export and production tax on a barrel of crude is 22 cents, compared with a former rate of 34 cents.

Texas Petroleum Production Steady

Crude oil in storage in Texas on July 18 was approximately 56,714,000 bbl., not including Mexican crude stored on the Gulf Coast. The average production of the state is steady. The Mexia-Currie district is increasing its output, especially the Currie-Wortham section. Here, recently, the Humphreys Oil Co. completed its No. 2 McGuire well, making 10,000 bbl. The average production of the Mexia district is now between 75,000 and 78,000 bbl. daily. In the Electra field the production is now about 20,000 bbl. daily. Of this the Texas Company produces 7,000 bbl. The pipe-line subsidiary of this company is completing a new pumping station in the Electra field to take care of the increasing production. In the Panhandle section of the state, it is reported that a well on the S. B. Bennett ranch, Carson County, has a good showing of oil.

In the Coastal district, the most interesting development was the completion of two wells at Goose Creek.

Searching for Oil in Australia

A deputation representing the Association of Oil Licensees, in Australia recently waited upon the Commonwealth Minister of Home and Territories, Senator Pearce, and requested that the government should secure the services of a qualified geologist and dispatch him to the Northern Territory to report on the possibility of discovering oil there, according to Reuter's Agency. It was pointed out to the Minister that oil licensees are placed in a difficult position owing to the absence of geological information respecting the territory. Senator Pearce, in reply, said a number of geological reports on certain parts of the territory were available. He pointed out to the deputation that the principal condition of the issue of a license for an area believed to be oil-bearing was that the licensee shall engage in the search for oil over the area covered by the license. He did not feel justified in recommending that the government should send a geologist into the Northern Territory unless he had evidence which would justify that action. He suggested action by the licensees, either individually or collectively, to prospect for the discovery of oil indications.

The Victorian Government petrologist, D. J. Mahony, who was employed by the Okes Durack Kimberley Oil Co. to report on the possibility of finding payable oil on its property, which covers 31,400 square miles in the Kimberley division of Western Australia, has reported that there is justification for drilling. He states that the source of the oil which has given rise to bitumen has been traced to a particular set of beds, and it now remains for drilling to prove whether oil exists in payable quantities.

A geologist representing the Mararoa Gold Mining Co., Adelaide, has left for the Katherine River, Northern Territory, to investigate supposed oil-bearing country.

Discoveries of free oil, inflammable gas and bitumen in the Daly River ranges, Northern Territory, have created great interest at Darwin, and several parties are arranging for a further search in the locality.

News from Perth is to the effect that the Central Oil Prospecting Syndicate has been formed for the purpose of examining the country between the transcontinental railway line and latitude 28 deg. east of Queen Victoria Springs, where indications of oil in the form of asphaltum or ozokerite are said to have been found.

Interest in oil prospecting is extending to the islands off the north coast of Western Australia, from the Buccaneer Archipelago to the Bonaparte Archipelago, and application has been made to prospect for oil in the islands.

Promising tests of shale from the Bairami-Widden shale oil field, near Mudgee, N. S. W., have been made. Inquiries are being put forth with a view of sending the shale to Great Britain.

Test boring conducted in the Latrobe district of Tasmania has confirmed the opinion of Captain de Hautpick, a Russian engineer, that there is every evidence of the presence of an oil basin, and that deep boring on a point to be selected will produce liquid oil in commercial quantities.

Petroleums, Ltd., has been registered in Sydney with a capital of £50,000, and the Barigan Shale Oil Co., with capital amounting to £60,000, has also been registered to acquire shale and coal properties in New South Wales.

Idaho Issues Bulletin on State's Petroleum Possibilities

The bulletin entitled "Petroleum Possibilities in Southeastern Idaho," by Virgil R. D. Kirkham, which has been published by the Bureau of Mines and Geology at Moscow, Idaho, is of more than ordinary value to the citizens of Idaho and, in fact, to any person interested in the development of new oil fields. In the foreword, Dean Thomson of the State University calls attention to popular excitement precipitated by wandering self-styled "geologists" and "oilologists" whose recommendations have caused wells to be drilled on the assumption that ash beds in Miocene basalt are Cretaceous sandstone. He states that the Bureau considers it a public duty to point out clearly the extent to which any area in the state fulfils or fails to fulfil the recognized requisites for a possible oil-bearing field. In conclusion he says that there are no parts of the state, other than those described, which are at present recognized as geologically favorable to oil formation and accumulation.

Professor Kirkham describes three districts known as the Border area, the Phosphoria area, and the Teton area, all lying along the Wyoming state line, in a continuation of the geological series that is oil-bearing in Wyoming. For each of these there has been prepared a separate geological reconnaissance map, showing synclines, anticlines, and structures, and each area is discussed in detail. Most valuable of all, however, is a succeeding chapter entitled "Factors and Conditions Essential to the Accumulation of Oil and Gas." Here, in plain language that the average layman can read with interest and profitable comprehension, he discusses these essentials under the five following heads: (1) A source of origin; (2) a reservoir or containing rock; (3) an impervious capping; (4) a suitable structure for trapping oil; and (5) a high water-saturation. Professor Kirkham then summarizes the areas described as being the least unlikely for the production of oil, stating that the Border and Phosphoria areas lie about fifty-five miles across country from the Labarge and Big Piney oil fields in Lincoln County, Wyo., and the Teton area about a hundred miles from the Wind River Basin of Wyoming, which has eight important producing fields. The factor that serves to nullify the handicap of too great separation is that the oil-bearing beds of Wyoming lie in promiscuously scattered patches all over the state.

The author finds no negative indications in the three areas, and concludes by indicating nine locations where, in his opinion, prospecting may be most intelligently and economically carried on, since "the chance of failure in an unproven area is greatly reduced by a selection of localities for drilling, based on geologic investigation." The bulletin, on the whole, is a valuable contribution to the constructive series already issued by the Idaho Bureau, and its value is still further enhanced by an excellent index.

Fort Norman Increases Production

A report received at Edmonton, Alta., to the effect that the discovery oil well at Fort Norman, which produced only four or five barrels per day during the winter, is now yielding 70 bbl. daily, is confirmed by vice-president McQueen of the Imperial Oil Co. He pointed out, however, that the production was not of commercial importance, owing to the distance of the well from a railroad.

Oil-Shale Mining Regulations Issued by Bureau of Mines

Operating regulations to govern the methods of mining oil shale, phosphate, sodium, and potash on leased public lands of the United States have just been issued by the Bureau of Mines, which is intrusted with the supervision of such operations. The regulations provide that it shall be the duty of the supervisor and district mining supervisors to visit from time to time leased lands where operations for the discovery or mining of oil shale, sodium, phosphate, or potash are conducted; to inspect and supervise such operations with a view to preventing waste of mineral products, or damage to formations or other mineral deposits; and to supervise operations and conditions for the promotion of the safety, health, and welfare of workmen. Supervisors will submit recommendations for safeguarding and protecting the lives and health of employees, the property, the minerals, and also of the mineral-bearing formations.

The lessee shall prepare such maps as in the judgment of the mining supervisor are necessary to show the surface boundaries, improvements, and topography, and the geological conditions so far as determined from outcrops, drill holes, prospecting, or general mining operations.

The underground and surface sanitary, welfare, and safety arrangements shall be in accordance with the recommendations of the U. S. Public Health Service and U. S. Bureau of Mines. All employees shall be afforded all possible protection to life and health. All mechanical equipment used for the transportation of men shall be of a safe design. Adequate shelter holes shall be made, guide rails or fences shall be erected, and warning signs shall be posted at dangerous walks or passages; all moving parts of machinery or belts, when endangering employees or liable to result in injury, shall be adequately guarded. In the mining and milling or treating of the ores or mined products, the employees shall be adequately protected from injurious fumes, acids, dusts, and harmful or dangerous conditions. In mines where siliceous or other harmful dusts are formed, drills shall be of the water-injection type and sprays shall be used to wet down the dust.

Lessees shall maintain for each underground operation sufficient amount of ventilation for such men and animals as may be employed therein.

The lessee shall store, thaw, transport, issue, and use explosives only in the most approved manner and with due regard for the safety and welfare of employees and protection of property.

Mining operations shall be conducted in a manner to yield the ultimate maximum recovery of the oil shale, phosphate, sodium, or potash, due regard being taken to protect with adequate pillars all shafts, main exits, and passageways, and also all beds or mineral deposits overlying the deposit being worked that at a future date may be of economic importance.

The regulations also cover the subjects of fire protection, escapeways, electrical equipment, disposal of waste rock, the submission of core or test hole records, and the practical application of improved milling methods.

Copies of these operating regulations may be obtained upon application to the Bureau of Mines, Washington, D. C.

Technical Papers

Petroleum in Borneo—*Economic Geology* for August (Lancaster, Pa.; price, 65c.) contains a thirty-six-page critical review by Arthur Redfield, of the geologic and geographic literature pertaining to petroleum in Borneo. A two-page bibliography is appended.

American Iron Ores—The Imperial Mineral Resources Bureau has issued another section of its monograph on the iron ores of the world. This is a 136-page board-bound book, and may be obtained from H. M. Stationery Office, Imperial House, Kingsway, London, W. C. 2, England, for 4s. 4½d. This is "Part 7—Foreign America" and describes briefly, with many statistics, the iron-ore deposits of the Western Hemisphere, with the exception of British possessions.

Ball Milling—In the *Bulletin* of the Canadian Institute of Mining and Metallurgy for June (603 Drummond Building, Montreal; price, 50c.) appears the paper on "Ball Paths in Tube Mills," by H. E. T. Haultain and F. C. Dyer, which we mentioned editorially some time ago. This paper was delivered at the last annual meeting of the Institute. the chief interest arising from the fact that it was illustrated by moving pictures. The text is not long, but is worth reading, and many of the illustrations showing the positions assumed by the balls are reproduced. Ball-mill operators will make no mistake in sending for it. Professor Haultain expects to have a much more complete set of moving pictures made before long to illustrate interior conditions.

Mine-Timber Preservation—A bibliography of articles relating to the preservation of mine timber has been issued by the U. S. Bureau of Mines, Washington, D. C., as *Reports of Investigations* No. 2,343, gratis.

Mining in Nova Scotia—The "Annual Report on the Mines, 1921," 102 pages, describes advances made in mining last year in Nova Scotia. It may be obtained on request to the Minister of Public Works and Mines, Halifax, N. S.

Colorado Geology—Bulletin 730-A of the U. S. Geological Survey, Washington, D. C., seventeen pages, illustrated with photographs and colored map, is entitled "Peneplains of the Front Range and Rocky Mountain National Park, Colorado." It calls attention to some of the major surface features in the Rocky Mountain National Park and points out their probable correlation with similar features in neighboring regions.

Australian River Improvement—"Harnessing Australia's Greatest River," an illustrated brochure describing the scheme for the storage and supply of water from the River Murray, may be obtained for $2 from the importers, Brentano's, Fifth Ave. and 27th St., New York.

Scale Standardization—Those interested in the standardization of weights and scales should send 5c. to the Superintendent of Documents, Washington, D. C., for Bureau of Standards Bulletin No. 208, "Weighing by Substitution." The plan of weighing presented can be used not only with laboratory precision apparatus but applies to large compound-lever scales as well.

The Comstock Lode—"Bonanza Ores of the Comstock Lode, Virginia City, Nevada" is the title of Bulletin 735-C of the U. S. Geological Survey, Washington, D. C., twenty-one pages, free on request. This paper reports the first detailed microscopic studies on Comstock ores, and offers additional encouragement to deep exploration.

Copper Ore Leaching—The Pechey leaching process, mentioned in these columns in our issue of Dec. 24, is the subject of another article which appeared in *Chemical Engineering and Mining Review* of March 5 (Melbourne, Australia; price, 11d.). The article covers five pages and gives a few additional details.

Ontario Silver Deposits—The Ontario Department of Mines, Toronto, has issued a fifty-four-page bulletin, illustrated with photographs and maps, describing the Gowganda silver area, and deposits in Auld and Cane townships. The Gowganda deposits have had attention before, this being the fourth report on that district. This is issued as Part III of the thirtieth annual report of the department, and may be obtained free on request.

Geochemical Functions of Water—J. M. Campbell has an interesting nine-page article in *The Mining Magazine* for April under this title. (Salisbury House, London Wall, London, E. C. 2, England; price, 1s. 6d.) The paper correlates many experimental data and facts observed in nature.

Electric Trucks—The April issue of the *General Electric Review* (Schenectady, N. Y.; price, 30c.) is devoted entirely to papers dealing with various phases of transportation with electric vehicles. There is also one paper on this subject in the May issue.

Western Mining—*The Mining and Financial Record* (Denver, Col.; price, 10c.) issued a special "Back-to-Mining" edition on June 3, with many feature articles on mines and prospects in that part of the country.

Alaskan Ore Deposits—Bulletin 722-F of the U. S. Geological Survey, Washington, D. C., obtainable on request, is a 100-page report on "Metalliferous Lodes in Southern Seward Peninsula, Alaska."

Cuban Nickel-Iron Ores—In *Chemical and Metallurgical Engineering* for Feb. 8 (New York; price 25c.) is an account of experiments on the leaching of Cuban nickel-iron ores. Formerly these have been smelted as iron ores, but it is believed that the nickel and manganese may be more profitably extracted by leaching before such smelting.

New Books

Recent arrivals include a two-volume handbook of the petroleum industry, published by Wiley, of which Dr. David T. Day is editor-in-chief. There are about 2,000 pages of fine print, so our reviewer must not be hurried. The book appears to be the Peele of the petroleum industry. It sells, we understand, for $15. The University of Chicago Press sends us "Essentials for the Microscopical Determination of Rock-Forming Minerals and Rocks, in Thin Sections," which the author, Dr. Albert Johannsen, says contains practically all of the data originally published in his "Determination of Rock-Forming Minerals," and in addition gives modes of occurrence and many more points of separation between similar minerals. This is an advanced laboratory manual. Prof. Wilfred W. Scott, of the Colorado School of Mines, has prepared a third edition, "thoroughly revised and greatly enlarged," of his well-known book on standard methods of chemical analysis. It has just been published, in two volumes of 1,600 pages, by Van Nostrand at $10. A review will follow before long, we hope.

The Metallurgical Chemist. By Sir Robert A. Hadfield. London: Chas. Griffin & Co., Ltd.

This attractive little volume is a potpourri of interesting historical data and general information on a number of subjects connected—some directly, others remotely—with science and metallurgy. The contents formed the text of what must have been an exceedingly lengthy address delivered before the Sheffield Association of Metallurgists and Metallurgical Chemists on Oct. 24, 1921. The subjects dealt with include an interesting account of the various chemical societies and the development of the chemical industry, as well as modern laboratory practice, the work of the chemical engineer, the influence of chemistry on the War and the position of the German chemist. A section is devoted to the indebtedness of the metallurgist to science; another to the subject of metallurgical literature; yet another to metallurgy and poetry. An interesting feature of the book is the detailed account given of the author's two great inventions—manganese steel and low-hysteresis steel. An authoritative statement gives the history of the Royal Society, and the book also contains sections on subjects of so diversified an interest as the water-falls at Niagara and Northern Rhodesia, the federation of engineering interests, American railroads and rapid cinematography.

The volume will form an interesting and educative reminder of the versatility and genius of one of the foremost metallurgists of the present day.

A. W. A.

SOCIETIES, ADDRESSES, AND REPORTS

Unemployment Ended, Reports Indicate

Acute Shortage of Labor in Spots—Lower Efficiency Charged to Inexperience—Foreign Workers Going Home

Telegraphic reports to the United States Employment Service indicate that unemployment throughout the country practically has disappeared and that acute shortages of labor have developed in certain localities. The shortages are particularly severe in some of the metal mining regions. This situation is believed to be due principally to the fact that, during the depression in metal mining, large numbers of workers skilled in that industry entered into other work. Apparently, the wages offered and working conditions at metal mines are not sufficiently attractive to induce these men to leave their more recent activities. Some are of the opinion that the higher cost metal mines are attempting to open earlier than market conditions justify. In view of the wages being paid coal miners and to those engaged in the automobile and other industries, it is doubtful if they will be able to obtain a full complement of experienced men at the present wage scale. At the same time, to pay an increased wage scale would increase costs to a point where such mines could not produce at a profit.

In connection with the labor situation at the metal mines, the observation is made that those having the best ventilation and the best working conditions are able to man all their jobs. The shortages of labor are confined almost entirely to those mines where working conditions are less desirable.

A falling off in efficiency at metal mines also is noted. The morale among the men is good. Loss of efficiency is not due to that loss of morale and feeling of responsibility which became so pronounced during the war. It is traceable almost entirely to lack of experience. A high percentage of the men working in metal mines today are beginners. Due to the restrictions on immigration, even the supply of raw material is almost totally absent. Reports from the metal mining districts indicate that there has been a considerable loss of their experienced miners of foreign birth, who, having amassed a few thousands of dollars in savings, find it to their interest to convert that capital into the cheap currencies of their home lands. With this capital and with the broadened outlook that has come with their American experience, the opportunities offered in their home countries outweigh those presented by the industries they have been serving.

Ceramic Society Members Visit Feldspar Deposits

About fifty members of the American Ceramic Society, who have been examining mineral deposits in Quebec and Ontario, made an inspection of the feldspar deposits in the neighborhood of Verona, Ont., on Aug. 17. They were favorably impressed by the quality and extent of the deposits, which constitute 90 per cent of the available feldspar supply of Canada, some of the party who are interested in ceramic manufacturing remaining over to make a closer investigation.

William McClellan Addresses Salt Lake Engineers

Dr. William McClellan, past president of the American Institute of Electrical Engineers, returning from the annual meeting, held Aug. 1 at Vancouver, B. C., was the guest and chief speaker at luncheon on Saturday, Aug. 12, at the Salt Lake City Commercial Club before an audience of engineers, M. C. Plumb, chairman of the Engineering Council, presiding. Dr. McClellan made a plea for engineers as well as all workmen, whether with hands or brains, to find a joy in their labor, in the work itself and in production, rather than solely in remuneration. He called upon engineers, in view of the spirit of unrest, discontent, and strikes abroad, to hold fast to the professional rather than what is commonly understood as the workman's attitude of mind; and to bring to the work of the hour the same spirit of courage and faith and joy in achievement that once dominated the pioneers of the transportation world.

South African Society Meets

After a period of nine years the South African Association for the Advancement of Science again held its annual meeting at Lourenco Marques (Delagoa Bay), during the week ended July 15, under the presidency of A. W. Rogers, the head of the South African Geological Survey.

The subject of the president's address was "Climates of Former Times." Dr. Rogers confined his address to a consideration of South African evidence from post-Cretaceous times only.

New Mining Congress Division

The American Mining Congress is creating a division of industrial cooperation as a part of its Washington organization. W. A. Grieves, of Columbus, Ohio, a specialist in the matter of industrial relations in the mining industry, has accepted the chairmanship of the division.

Mining Congress' Western Division to Hold First Conference

Sept. 8-9 Set for Meeting in Salt Lake City—Delegates from Thirteen States Appointed

The recently organized Western Division of the American Mining Congress will hold its first conference at Salt Lake City, Sept. 8 and 9. The division includes thirteen states, each of which will have a representative on the Western board of governors. Seven states have thus far named delegates to the coming conference, and others are expected to follow. These representatives are: D. D. Muir, Jr., Utah; George Stahl, Colorado; John M. Sully, New Mexico; Edwin Higgins, California; Robert Talley, Arizona; Sidney Norman, of Washington; and William F. Word, of Montana. The purpose of the organization is to afford a medium for greater co-operation and unanimity of thought and action among Western mining men. Burton Bunch, the Western secretary, is now in Salt Lake City.

Spokane Chamber of Commerce Asks Higher Duties on Magnesite

At a meeting of the mining bureau of the Spokane (Wash.), Chamber of Commerce, held Aug. 21, Congressman J. Stanley Webster was the principal speaker. The topic discussed was the tariff on crude and dead-burned magnesite, which had been fixed by the House at $10 and $15 per ton, respectively, and considered favorably by the Senate in committee of the whole, but which by an amendment of recent date was reduced to $6.25 and $8 per ton respectively. The sentiment of the meeting was crystallized in a resolution drawn up by a committee and telegraphed to Washington to Representative Fordney, with a view to securing his assistance when the matter came before the House committee for final adjustment. The resolution read in part as follows:

"Improvements provided at an expense of several million dollars would be sold as junk. Substitution of House schedules, already twice agreed upon, would insure preservation of an American industry, providing employment to between 500 and 1,000 citizens at good wages in Stevens County, Wash., alone. We respectfully request your support of House schedules in conference. The Republican Party cannot justify the destruction of a domestic industry indispensable in war and necessary in peace in favor of a foreign industry used against American soldiers in the recent war."

SOCIETIES, ADDRESSES AND REPORTS

Continued

Canadian Geologists Report on Work in British Columbia

A summary report of the work of the Canadian Geological Survey in British Columbia during 1921 contains reports of seven geologists who were in the field. Dr. W. E. Cockfield discusses the silver-lead deposits of Davidson Mountains, Mayo District, Yukon Territory. He is of the opinion that unless the ores or concentrates from the district can be made to return $100 to the ton, shipments to the smelter can scarcely be made to pay. Dr. George Hanson deals with the Upper Kitsault Valley. With reference to properties adjacent to the Dolly Varden mine, he states that the vein on the North Star group is 4 ft. wide and has been traced for 500 ft. The vein on the Toric group is from 4 to 12 ft. wide and has been uncovered for 500 ft. On the Wolf and Tiger groups the greater part of the ore is low grade. On the Wolf property there are two veins from 10 to 50 ft. in width—the largest orebodies known in the district.

Dr. Victor Dolmage, who spent the summer on the coast and islands of British Columbia between Burke and Douglas channels, reports on gold, copper, magnetite, and galena deposits. He states that there are eight hot springs in the district. J. D. McKenzie contributes an interesting report on the geology of Lasqueti Island. Dr. W. A. Johnson, who reports on the placer country, Williams Creek, Cariboo, says that gold dredging has not yet been attempted in the Barkerville area. High cost of operating is the deterrent factor, but the belief is expressed that dredging will be started on Antler Creek. Professor W. L. Uglow discusses the Chu Chua coal area, while Dr. M. F. Bancroft reports having found in the Lardeau district a wide variety of minerals, some of those mentioned being gold, nickel, asbestos, manganese, and talc.

Committee to Report on Future Fuel Supply

The research committee of the Petroleum Section of the American Chemical Society, appointed to make a special study of the motor-fuel problem in America and to conduct researches as to the most efficient uses of the supply now available, the best means of supplementing the supply and other related problems, will make its report at the Pittsburgh meeting of the society, Sept. 4 to 9. This is announced by Dr. W. A. Gruse, secretary of the Petroleum Section, together with the complete program of the section.

W. F. Faragher, of Mellon Institute, Pittsburgh, will make the report of the committee. Van. H. Manning, director of research of the American Petroleum Institute, will discuss the work of the committee.

MEN YOU SHOULD KNOW ABOUT

Ernest Bamberger, mining engineer, of Utah, has recently been nominated as the Republican candidate for United States Senator. Mr. Bamberger was born in Salt Lake City in 1877. He was graduated from Williams College and later took a post-graduate course at Columbia University. He has extensive mining, land, and livestock interests throughout the West and at present holds the position of general manager of the Ontario Silver Mines Co., the Keystone Mining Co., and the Nail-driver Mining Co., all of which properties are located in the Park City district of Utah. During the war he volunteered and was assigned to the position of head of the Chemical Division and later to that of Chief of the Materials Department for the United States and the Allies of the Aircraft Production Board. At present he is a member of the Federal War Finance Board and Agricultural Loan Agency and is the Republican National Committeeman for Utah, succeeding Reed Smoot.

Ernest Bamberger

R. G. Hall, who has been in San Francisco on business, has gone to Shasta County, Cal.

Eugene Dawson has gone to Spain on professional business. He will return to New York in about six weeks.

C. E. Dawson, assistant manager of the Trojan Mining Co., at Deadwood, S. D., has been placed in charge as manager.

D. M. Liddell succeeds **B. B. Gottsberger** as secretary of the Mining and Metallurgical Society of America, effective Aug. 23.

W. J. Rolfe, manager of the Associated Goldfields of Larder Lake, has resigned to rejoin the staff of the International Nickel Co.

F. B. Ely, of the Bedford Petroleum Co., has gone to Europe for an indefinite time. He will be engaged in the examination of oil lands.

F. P. Williams is supervising some lead-silver mining operations near Alamos, Sonora, Mexico. He may be reached in care of T. Robinson Bours y Hnos.

Harry Mills, Ontario Minister of Mines, and **Thomas W. Gibson,** Deputy Minister, are making a trip of inspection of the gold camps of northern Ontario.

Francis Winslow, mining engineer, a graduate of Yale Scientific School, has been appointed assistant in the Division of War Minerals Supply, Bureau of Mines, Washington, D. C.

Charles F. Williams, who returned from the Mayo district, Yukon Territory, Canada, several months ago, is now with the Hilltop Nevada mines, near Battle Mountain, Nev.

Leon J. Pepperberg, geologist and engineer, announces the removal of his office from the Great Southern Life Building to the American Exchange Bank Building, Dallas, Tex.

Robert Scholt, formerly superintendent of the New Silver Queen mine, in the Black Hills of South Dakota, has been placed in charge of the Richmond-Sitting Bull mine, at Galena, S. D., which has just resumed operations after long idleness.

Thomas F. Cole and **E. J. McNamara,** of New York, and **W. F. Bartholomew,** of Boston, directors in the Seneca Copper Corporation, are in the Lake district on a visit of inspection to the Seneca property.

L. G. Huntley and **Stirling Huntley,** formerly with Johnson, Huntley and Somers, have formed the partnership of Huntley & Huntley. They intend to specialize in petroleum engineering and geology, in both the United States and foreign fields.

T. T. Read, chief of the information service of the U. S. Bureau of Mines, is one of the six delegates designated to represent the Federated American Engineering Societies at the International Engineering Congress, to be held in Brazil Sept. 7 to 30. Mr. Read sailed for Brazil on Aug. 24.

Mining and metallurgical engineers visiting New York City last week included: **A. D. R. Galloway,** of Accra, West Africa; **Homer C. Neal,** of Southington, Conn.; **Frank A. Crampton,** of Santa Monica, Cal.; and **Oscar Lachmund,** of Spokane, Wash.

OBITUARY

William A. Macan, a pioneer in the magnesia and asbestos field, and vice-president of the Ehret Magnesia Manufacturing Co., of Valley Forge, Pa., died suddenly on Aug. 21. He was in his sixty-ninth year.

THE MINING NEWS

The Mining News of ENGINEERING AND MINING JOURNAL-PRESS is obtained exclusively from its own staff and correspondents, both in the United States and in foreign fields. If, under exceptional conditions, material emanating from other sources is published, due acknowledgment and credit will be accorded.

Leading Events

ENTRY of the Nipissing Mining Co. and a new company, the Continental Mines Co., into the Kirkland Lake gold area in northern Ontario, is discussed by Alexander Gray in this issue.

The suit over the Engineer mine, at Atlin, B. C., has been referred to the Privy Council, the executors of the estate of the late Captain Alexander having won previous actions which were brought in the Supreme Court and Court of Appeals of British Columbia.

Possible absorption of the Hull Copper Co. by the United Verde Copper Co., whose property adjoins that of the former, is rumored in the Jerome district in Arizona.

Development of public mining lands is being retarded, it is believed in Washington, necessitating new methods for financing common carriers.

Fire Traps Miners at Work in Argonaut Mine

Forty Men Caught Below 4,000 Level —Second Disaster in Three Years

By Wire

San Francisco, Aug. 28.—Fire started on the 3,000 level of the Argonaut mine, near Jackson, Cal., at midnight Aug. 27. Three men working on the 4,200 level escaped through the smoke to the surface. About forty men on the 4,500, 4,600, and 4,800 levels were cut off. Communication with them was also cut off, all signalling apparatus having been rendered inoperative. Five hundred feet of shaft caved on Aug. 28, making rescue improbable. An attempt made to reach the men from the adjoining Kennedy mine was frustrated by a cave-in.

Last fall the Argonaut and the Kennedy companies resumed operations after a prolonged shutdown caused originally by a fire which started in the Argonaut workings on March 27, 1919. The mine was sealed and the fire thought to be extinguished by the use of carbon dioxide gas, which was forced into the mine on April 3, 1919. The mine was reopened on April 12, and the fire broke out again on April 13. It was then bulkheaded, but later it was found necessary to flood both the Argonaut and Kennedy. Flooding of the mines started March 15, 1920. In May, 1921, both mines were unwatered, and were reopened last fall.

Copper Found in Faroe Islands

By Cable from Reuters to "Engineering and Mining Journal-Press"

Copenhagen, Aug. 29—During blasting operations in connection with the government port works in the Faroe Islands a deposit of copper was discovered.

Nipissing and Other Mining Interests Enter Kirkland Lake Field

Greater Participation by American and Canadian Capital Indicated—Continental Mines Co. Organized by Mein and Warriner

By ALEXANDER GRAY

THE GOLD FIELDS of Ontario are now undergoing exploration and development on a scale that was not unexpected. Representative combinations of capital such as the Nipissing, Tonopah, and Kerr Lake companies have had under consideration the development of extensive areas and are impressed with the possibilities of the geology and fractured structures. Kerr Lake is testing properties in the vicinity of Pearl Lake, at Porcupine; Tonopah engineers are in charge of operations at the Herrick, in West Shining Tree; and Nipissing has taken under option a large acreage on what appears to be the southern extension eastward of the producing section at Kirkland Lake. Likewise, a new company, the Continental Mines Co., organized under the auspices of R. C. Warriner and William Wallace Mein, with the former as president, in a way has blanketed 1,100 acres immediately adjoining the Kirkland Lake Proprietary, known to have the geological features and fractures characteristic of the Kirkland Lake Proprietary, Sylvanite, Wright-Hargreaves, Lake Shore, Teck-Hughes and Kirkland Lake Gold, in the order named.

Manifestly, the mining corporations named have decided that the Kirkland Lake fields have established factors of lateral and vertical continuity. To date, producing mines have accounted for over $7,500,000. Deeper workings having disclosed a better grade of ore throughout the producing two and three-quarter miles, Nipissing has hitched on to what is regarded as an eastern continuation, and Messrs. Warriner and Mein, on behalf of Continental Mines, have taken over three miles of ground from the eastern side line of the so-called Tough-Oakes. In addition the Continental has absorbed the Colonial Silver Mines, at Cobalt, where a three-compartment shaft is going down 800 ft. to a contact on which the O'Brien is obtaining silver ore comparable with the best Cobalt yielded in its bonanza days.

It is the extent of the Nipissing participation—even though it be on a probationary basis—that has given the Kirkland Lake country a new status. Nipissing, somehow, tried and found wanting many things in northern Ontario and at other centres of activity. R. B. Watson, the company's operating chief, is recognized for his thoroughness. As a constructive force, he has realized that the greatest of silver producers must maintain its standard. Properties large enough for Nipissing reproductive investment purposes have been assiduously sought. Periodically, Nipissing has tried out meritorious prospects, but not until now did it quietly take over a combined area so placed that if the favorable faultings noted to the west exist where Mr. Watson and his staff think they may be—and where Dr. Goodchild, of London, holds they should be—Nipissing will continue to be one of the pre-eminent Canadian producers.

Considering this, and the extreme

conservatism displayed by Mr. Watson ever since he took charge of Nipissing, the advent of Messrs. Warriner and Mein and those for whom they act creates a dual situation at Kirkland Lake likely to be followed by rapid developments. Nipissing will enter upon a drilling campaign, after preliminary surface exploration. Continental Mines having mapped the more westerly of its areas — next to the Kirkland Lake Proprietary—will employ the diamond drill, having definitely located what seems to be the extension of the main line of beneficial faulting.

To begin with, it is understood, the intention was to operate the Colonial Silver ground at Cobalt abutting on the O'Brien and Violet properties. The O'Brien mine has been a continuous shipper since the earliest days. Only recently did the Violet assert its worth as a source of high-grade ore, so high that a lawsuit between the O'Brien and La Rose companies about the boundary is being carried to the Privy Council. Moreover, the O'Brien No. 6 vein, it was reliably reported, having been followed to within a few feet of the Colonial line and sunk on from 800 ft. to 1,000 ft., it was concluded by one of the Continental principals that the Colonial was worth having. So a trip to Erie, Pa., resulted in a deal. Others had striven to acquire the Colonial as about the last of the unworked more central Cobalt sections. Continental got it, and then companies operating in that vicinity strove to effect a co-operative arrangement. Acting for Continental, Messrs. Warriner and Mein took the proposition on formation and underground facts as ascertained.

Singularly, the Colonial has lain fallow for almost a decade and a half. The company was incorporated for $6,000,000, was sponsored to some extent by the McCornicks, was involved in litigation, and was misunderstood until the importance of contacts was fully realized.

Cobalt disdained milling rock when "Philip drunk" rock—really bullion—meant fireworks. King Edward and Silver Cliff mines, to the immediate east of the Colonial, had spectacular silver ores. Colonial surface work did not disclose any. It remained for the O'Brien to prove the Colonial at depth —and for the Continental to make the sporting bet by letting a contract for an 800-ft. three-compartment shaft in the confident expectation that what the O'Brien is recovering across the line will continue into the Colonial. Other shafts at Cobalt are down to that depth, but the Continental people are the first to take such a long shot.

Pending the completion of the shaft the Continental plan is to prove the Kirkland Lake areas, which have been under investigation all summer. No doubt, further details of these enterprises will be forthcoming. It is understood the Continental company capital will be $3,500,000, and the financing arranged in New York and Toronto.

Cornucopia Mines Co. Suffers Fire Loss

Fire recently destroyed the upper camp buildings and tramway terminal of the Last Chance mine, a property of the Cornucopia Mines Co., in the Cornucopia district, eastern Oregon. The output of the Last Chance was about 100 tons of gold ore per day. The tramway between mine and mill has the longest span in the country, this being 3,300 ft. unsupported between towers. The Cornucopia Mines Co. is the largest gold-mining company in Oregon. The plant destroyed had not been used in some time. It is a modern installation which, because of its peculiar precipitous location, has been referred to at times as "Eagle's Nest." The depressed state of gold mining has caused the Cornucopia and other eastern Oregon gold mines to suspend operations.

Photo by L. Panter

Buildings and upper tramway terminal of Last Chance mine of Cornucopia Mines Co., Cornucopia, Ore., which have just been destroyed by fire. Aerial tramway leads to mill in canyon and has largest unsupported span in the United States, 3,300 ft. Total length of tram 5,500 ft.

State Mining Idea Abandoned in Dutch East Indies

By Cable from Reuters to "Engineering and Mining Journal-Press"

London, Aug. 26—A message from Batavia states that the Netherlands East Indian Government has decided to abandon the principle of working the mineral deposits by the state. The announcement is made that important deposits of iron ore in the Celebes, which were recently investigated by an official commission, will be worked by private capitalists. The same ruling applies to various deposits of tin and gold and presumably petroleum wells.

Rumored United Verde Will Absorb Hull Copper

A meeting of the Hull Copper Co. was called for Aug. 30 at Jerome, Ariz., to consider the disposition of the company's property to pay its debts, including a judgment held by Charles W. Clark, trustee. It is believed that this is preliminary to absorption of the property by the United Verde Copper Co. and the dissolution of the Hull corporation.

Northport Smelter Being Dismantled

Dismantling of the Northport Smelting & Refining Co.'s smelter at Northport, Wash., which was purchased recently by the American Smelting & Refining Co., is proceeding rapidly. Thirty-five men are employed, and twelve carloads of machinery have already been shipped to the East Helena smelter of the company. The equipment to be removed will be the roasting machinery, blast furnaces and other apparatus essential in lead smelting and will be used at the East Helena smelter in treating an increased tonnage of lead-silver ores of the Coeur d'Alene district. The equipment of the Northport plant was purchased but a few years ago and is practically modern. The buildings will not be removed at this time.

Suit Over Engineer Mine Goes to Privy Council

The ownership of the Engineer mine, Atlin, B. C., upon which has been placed a valuation of $3,000,000, is to be decided by the Privy Council. The issue is between the executors of the estate of the late Captain Alexander and the Engineer Mining Co. Members of the latter company claim that they were the original locators and improvers of the property, and that while their application for a certificate of improvements was held up in the registers, Captain Alexander staked over their property. Before both the Supreme Court and the Court of Appeal the Engineer Mining Co. has lost its suit, but is now making an appeal to the highest court in the empire. Meanwhile the further development of this well-known and rich gold property is held in abeyance.

News from Washington

By PAUL WOOTON
Special Correspondent

Coal Control Unnecessary, Argued by Opponents

Others Hold It Must Be Established, With Railroad Situation So Uncertain

Principal emphasis is being placed by those opposed to legislation looking to the control of coal prices and distribution on the argument that such control no longer is needed. Many lawmakers are of the opinion that the situation is such that it can take care of itself. Those who favor the legislation might be willing to accept the argument if they were sure that the railroads could function at a high rate of efficiency. With the uncertainty as to railroad operation, however, they contend that this control must be established. They contend that at the end of price control in 1919 everyone was confident the situation would take care of itself, but they point to the profiteering in coal in 1920 as a glaring instance wherein the government did not function in the protection of the public. They think the country is in much the same frame of mind now, but they deprecate statements intended to create a false sense of security at the present time.

They point out that the emergency will not have passed until coal starts moving to the Northwest at the rate of one million tons a week; until prices show a definite downward tendency, and until the anthracite mines are in operation and careful attention has been given the problem of substitution for that portion of the anthracite production which cannot be made up. Before the situation can improve very rapidly, it is believed, the railroads must be in a position to transport 9,000,000 tons of bituminous and 1,700,000 net tons of anthracite per week.

Theoretically, at least, all stocks of coal now have been wiped out. Whatever stocks there may be in fact are known to be negligible and too low to enter the winter with safety. The market cannot be expected to tranquillize until a considerable amount of coal has been put in storage. How soon such a point can be reached depends entirely on the service which the railroads can give. The American Railroad Association makes the ambitious estimate that the carriers can transport 9,000,000 tons weekly. At the National Coal Association it is thought that 8,000,000 tons is the maximum. Disinterested traffic men, however, point out that if coal shipments reach 8,000,000 tons of bituminous, in addition to the anthracite that is expected soon to be moving, and at the same time, the usual volume of other freight is handled, the railroads will have performed an extraordinary feat even if there were no strike and if the equipment all was in good condition.

Development of Public Mineral Lands Retarded

Formerly Done by Common Carriers—New Methods of Financing These Now Required.

It is becoming increasingly apparent, both in official and unofficial circles, that new methods of financing common carriers must be worked out if there is any general development of the minerals on the public lands, which come under the General Minerals Leasing Act. In the old days, development in the West usually was brought about by a group of men, or a group of interests, who would build a railroad and at the same time develop some of the natural resources along its route. In some cases, the profit would appear in the form of railroad earnings, but more frequently, it would be manifested in the other activities in which the owners were concerned. This had the effect of creating a monopoly in the hands of those who control the transportation. When abuses developed, laws were passed intended to prevent unfair domination by railroad companies.

These ideas have been carried into the Leasing Law and under the limit of area prescribed, no lessee controls enough oil, coal, or other mineral to justify him in financing a pipe line, a railroad, or other common carrier. The Leasing Act provides that several lessees may join to finance such a common carrier, but as a practical matter even a group of lessees seldom have enough money to permit of such an undertaking. It is impracticable to attempt to transfer leases to moneyed persons who might be interested in the transportation needed, because they could not go far on such a basis until they would have direct, or indirect, interest in several leases. In most regions the tonnage prospect is not sufficient to attract capital interested solely in transportation.

Insofar as the coal deposits covered by the Leasing Act are concerned, many are of the opinion that it would be helpful to extend to them the services of wholesale coal companies. These companies could make contracts to purchase the output of mines operated under Government lease or on fee. A company in this way could sign up enough tonnage to justify the construction of the necessary railroad facilities to get the coal to market. The same plan could be applied to the other minerals covered by the act.

There have been cases in court which seemed to indicate that contracts to purchase, as a measure of control, do not fall in the same category as do monopolistic contracts to sell, and accordingly may be the basis of a combination not subject to attack under the anti-trust statutes, except as they may offend in some other manner. If this scheme of financing should be adopted,

it would have the effect of making the coal companies, or other mineral-producing companies, more important than the railroads, which is such a reversal of long-established practice and thought that a campaign of education would be necessary before it would be possible to market their securities. It may be stated authoritatively, however, that the plan is receiving serious consideration.

Reorganization of Executive Still on Slate

There has not been the slightest surrender on the part of the Administration of its intention to bring about practical reorganization of the executive departments of the Federal Government. A tentative report was laid before the President several months ago. It has not been made public, owing to the fact that the report as submitted is not acceptable to all of the department heads. It is believed, however, that certain changes in the plan can be made so as to secure for it the unanimous support of the department heads or at least any dissenting opinions that may be offered will be of minor importance.

Were the report to be sent to Congress without the endorsement of certain of the department heads, it is recognized that the possibility of securing the legislation would be lessened. Moreover, the legislative situation, since the report was submitted to the President, has been such as to preclude action on reorganization. In addition, if the report were made public in its tentative form and before unanimous endorsement by department heads has been secured, there is a feeling that it would invoke non-constructive criticism and arouse agitation which would serve no good purpose.

It can be stated authoritatively that the reorganization proposal has not been laid aside indefinitely.

Dick's War Minerals Claim Allowed

Subject to the approval of the Secretary of the Interior, the War Minerals Relief Commissioner has recommended an award of $1,711.34 in the claim of J. C. Dick & Co., of Salt Lake City. This claim was denied by the former War Minerals Relief Commission on the ground that there had been no request or demand from the Government. Under the amended act, the company was able to establish the fact of stimulation through published articles which permitted a showing on which the above recommendation was made.

The claim of J. E. Prescott, of Baker, Ore., was disallowed because, in the opinion of the commissioner, stimulation was not established.

Government's Silver Purchases

Purchases of silver by the Bureau of the Mint during the week ended Aug. 26 amounted to 1,555,506 fine ounces. This brings the total purchases under the Pittman Act to 126,499,506 oz.

News by Mining Districts

London Letter

British South Africa Co. to Turn Mineral Rights Over to Government—Development of Belgian Congo

BY W. A. DOMAN

London, Aug. 18—When the terms of inclusion of Rhodesia in the Union of South Africa were published it was understood that the British South Africa Co. would retain its mineral rights. Subsequently a statement cabled from the Cape suggested that the mineral rights would be handed over to the Union Government. At the meeting of shareholders of the company held recently it was fairly well hinted that there were points of disagreement. Now a cabled message from Gatooma (Rhodesia) reports General Smuts as regretting that the Union Government could not agree with the Chartered Company as to the expropriation of its mineral assets. Divorced from its mineral rights, the Chartered Company would have little to work upon, for its railways and land are also to be handed over under the scheme. Backward as the management of the Chartered Company is in some quarters alleged to be, the directors seem to recognize that they have great bargaining power in minerals. Even General Smuts does them the justice of saying they have not been unfair in the exercise of their undoubted rights. General Smuts, however, takes a broader view of the question, and thinks that the development of the country would proceed more rapidly if the minerals were in the hands of the government than in the hands of a private corporation. In most countries mineral rights belong to the state, and presumably by the strength of its bargaining power the Chartered Company will eventually make some satisfactory arrangement with the government in the event of Rhodesia becoming an integral part of the Union.

There is considerable perturbation in certain quarters in regard to the development of the Belgian Congo. The copper deposits, said to be the largest in the world, are owned by the Union Miniere du Haut Katanga, in which the Tanganyika Concessions, a British company, holds approximately a 39-per cent interest. Transport is at present effected by means of the Beira Railway on the East Coast of Africa. But Tanganyika Concessions has surveyed a line of railway on the West Coast from Lobito Bay to the northern Congo frontier to connect with a Belgian line. Some 325 miles of the 800 miles route from Benguella is in operation and revenue producing, though before the railway can be completed additional capital is required. It was thought that the British Government under its Trades Facilities Act would assist. The application has, however, been turned down, and the people in control are looking to the United States for funds.

Johannesburg Letter

Bounty on Iron and Steel Considered—Coinage Bill Up at Cape Town—Labor Situation Dull

BY JOHN WATSON

Johannesburg, July 18—The Board of Trade and Industries, appointed by the Union Government to consider the question of tariffs, has recently issued a report on the question of bounties for the iron and steel industry. It still remains to be proved, they say, that our enormous deposits of titaniferous iron ore can be profitably worked. We have in the country ample supplies of good iron ore, of fluxes and of coking coal, all within moderate distances of one another in the Transvaal. The board is convinced that the grant of bounties to a concern not capable of turning out at least 50,000 tons per year of iron or steel, or 100,000 tons of the two together, would be a waste of money.

The Coinage Bill was discussed in committee of the House of Assembly at Cape Town on July 10. It is the policy of the government to open a mint at Pretoria as a branch of the Royal Mint. British sovereigns will be coined; but the Union will produce its own silver coinage and at some future date the British silver coinage will be recalled. An amendment by the Minister of Finance (Mr. H. Burton) to include the farthing as legal tender, was agreed to.

The labor report for June for the Johannesburg district says: "During the month a good number of men have been engaged or re-engaged, by the gold mines; but the state of the labor market generally is deadly dull. The Dunewart-Apex railway detour is providing temporary relief to 400 men in that portion of the East Rand. The mines now have, approximately, a full supply of native labor. Expansion and development must be resumed before there is work for any appreciable number of the unemployed; 225 white men previously working underground and 29 ex-clerks took pick and shovel relief work during June. The Rand gold mines are now buying only urgent immediate requirements as regards engineering supplies, owing to the economic situation.

W. P. Taylor thinks that a committee should be formed in the Potchefstroom district to approach the government with a view to working the gold reefs known to occur there. He knows of one mine (within twenty miles of Potchefstroom Town Hall) which is estimated to contain 9,000,000 tons of ore. About 200,000 tons already milled gave an average of 8 dwt. per ton. Changes are required, Mr. Taylor thinks, in the Gold Law. He knows of one small mine which has produced £65,000 value of gold without profit. Its contribution to labor, stores, the government and railways has been excessive.

QUEENSLAND

Reports Available on Mungana Mines —Good Ore in No. 4 North Phoenix

From Our Special Correspondent.

Brisbane, July 17—Before the government decided to purchase the Mungana mines, near Chillagoe, to assist in providing supplies to the state smelter at that place, it now appears, reports were obtained on those properties not only by departmental officials but by an outsider, William Poole, who was at one time director of the Queensland School of Mines. The principal mines acquired were the Lady Jane and the Girofla. Mr. Poole shows that in 1917, before the mines were shut down, the former had been worked out down to the 220 level. Since the Girofla mine had been reopened there had been developed a large orebody, the available tonnage from which is estimated at 55,000 tons, averaging in value 12 per cent lead, 11 oz. silver, and 0.67 per cent copper. In another part of the mine a body of rich sulphides was found alongside old workings at a depth of 100 ft., while Mr. Poole confidently expected that further discoveries of important orebodies would be made at both mines. The development of these new orebodies would provide a large supply of good ore for the smelters without waiting for the unwatering of the workings to the lower levels, and also a profit in working sufficient to pay for the mines. The ore reserves proved in the Girofla were 160,000 tons, containing from 9 to 12 per cent lead and from 5 to 11 oz. silver per ton; in the Lady Jane, 50,000 tons, giving 25 per cent lead and from 12 to 35 oz. of silver per ton.

Two remarkably good crushings have recently been reported from an old mine on the Gympie gold field—the No. 4 North Phoenix. The first gave the excellent return of 3,400 oz. from 120 tons of rock, or over 28 oz. to the ton; while the second crushing consisted of 129 tons and yielded 711 oz. The mine has been worked for over forty years and has made good profits in the past, but the former of the two returns now obtained is by far the best in its history. The company owning the property has paid dividends amounting to £164,000, and all that the shareholders have paid into the concern is £787. The mine has always been patchy (the total output last year was only 1,268 oz., valued at £4,496).

A gold mine called the Minnie Moxham, at Northcote, in the Chillagoe mineral field, has lately been attracting attention. It is a comparatively old mine, but has lately been revived with the help of a government subsidy. When it was reopened the first shot fired disclosed ore, 5 ft. in thickness, showing free gold, and some fine blocks of specimens were obtained. The lode, when driven upon, varied from 1 ft. to 6 ft. in thickness at a depth of only 130 ft., and is worth over 1½ oz. per ton. Even as a low-grade property, the mine is expected to pay handsomely.

BRITISH COLUMBIA

Question of Financing Iron and Steel Venture Goes to London

Victoria—The arrangement of finances in connection with the establishment of an iron and steel industry in British Columbia is to be discussed, according to report, in London. W. S. Fielding, Minister of Finance, has left for the Old Country and is said to be prepared to take up this question. The Imperial Trade Facilities Committee is quoted as saying that $4,000,000 of its funds are available for the western Canadian enterprise. There is a possibility that a member of the British Columbia Government will proceed to England in connection with this matter.

Stewart—An offer was made by the Premier Gold Mining Co. last June of $1,000,000 for the option to purchase within a two-year period the 60-per cent interest held by the Selukwe Gold Mining & Finance Co., of London, in the B. C. Silver Mines, Ltd. The Premier company submitted also that if the Selukwe people would extend the time of the proposed option the bond price would be increased. In reply the Selukwe representatives suggested a price of $5,000,000 to be paid over a period of four years. H. A. Guess, acting for the Premier company, declined to consider this proposal. It will be recalled that the Premier company some months ago paid $100,000 for the 40-per cent interest now held by it in the B. C. Silver Mines, Ltd., which property is believed to contain a continuance of the Premier lead.

Indicative of the growing importance of the Portland Canal mining section is the announcement that a Canadian customs office is to be established at the international boundary opposite the United States customs office already established there. This is for the purpose of facilitating the transport of supplies and material for Canadian mines in the district, as practically all this material must cross Alaskan territory. It is considered likely, too, that an aerial station will be installed at the town of Stewart.

New Hazelton—One of the most interesting events that has taken place here for some time, and one that presents great possibilities, was the sending of 1,500 lb. of supplies from here to a mining prospect on Thurdale Lake, in the Peace River region, by hydroplane. The trip was made in two hours. Previously all supplies had been taken to this property by pack trains, which took from five to six weeks to make the round trip, owing, of course, to the absence of trails and bridges over a considerable part of the route.

Princeton—Plans have been advanced for reorganization of the Canada Copper Corporation. The reorganization plans provide for holders of common stock receiving one share of the new issue for every eleven shares of the old stock held by them, the holders to pay $5 per share for the new issue.

ONTARIO

Teck-Hughes Doing Well—Drilling in Sand Plains Near Timmins Stopped

Cobalt—The results at the McKinley-Darragh, since the resumption of operations, have been satisfactory, and a good monthly profit is being realized. A new ore shoot has been found in the Cobalt Lake fault, which, in one place, shows a width of 3 ft. of high-grade ore.

Kirkland Lake—The fiscal year of the Teck-Hughes closed Aug. 31, and it is understood that the production will be $570,000, compared with $305,000 the previous year. The mine is making remarkable strides for the better, and production for the last five months of the fiscal year equals the total production for the preceding year. It is understood that profits will be approximately $250,000. The future production will be about $60,000 a month, and it is expected that the company will soon go on a dividend basis.

Wright-Hargreaves is treating 200 tons of about $12 ore, and on the new vein, recently discovered, 150 ft. of drifting has been done, with values higher than for the average of the mine. Shaft sinking to the 1,000 level has been started.

The Argonaut directors have again changed their minds and decided to proceed immediately with the construction of a mill.

Crosscutting on the 500 level has been started on the Sylvanite, which is considered to be the most promising undeveloped ground in Kirkland. Shaft sinking will be continued below the 500 level.

The Tough-Oakes mill has again started, following a shutdown caused by the slow delivery of ball-mill repair parts.

Control of the Chaput-Hughes has been sold to New York interests.

Hattie shareholders have ratified the proposal to sell 600,000 shares at 25c. to John Irving and Carlos Warfield, the money to go into the development of the property.

Porcupine — Minneapolis interests, who took an option on a large block of claims in the sand plains west of Timmins, have thrown up their option. The claims were extensively explored by diamond-drill holes, which were put down for geological purposes only.

A rich surface discovery has been made on the Holtyrex. Diamond drilling has been discontinued, and there is much mystery as to the results obtained.

It is understood that the Davidson has $450,000 cash in the treasury, with an additional $500,000 on call. Diamond drilling is being continued, but no underground work is being done.

West Shining Tree—Sinking has been started on the Herrick by the Tonopah Mining Co., which has the property under option.

The Algonquin Mines, Ltd., with a capitalization of 2,000,000 shares of $1 par, has been formed to take over a group of claims adjoining the Herrick.

ARIZONA

Suit Filed Against Copper Reef Consolidated—U. V. Extension Rumored to Have New Orebody

Phoenix—Suit has been filed in the United States Court at Tucson by William L. Curry and Peter Boyd, both of Pennsylvania, against the Copper Reef Consolidated Mines. The complaint alleges gross mismanagement and asks appointment of a receiver. It is recited that the corporation, organized in 1910, has little money in the treasury and has assets mainly in the mines and in a small amount of machinery, while owing $80,000 under a judgment of a Pennsylvania court and $25,000 in Arizona debts. In 1910, it is alleged, $200,000 was paid into the treasury of the corporation.

In the Superior Court at Prescott, judgment for defendant was given in an action brought by the Arizona Jerome Copper Co. and Joseph Winchester against Thomas Smart, who established to the satisfaction of the court that since 1917 he had held peaceful possession of twenty-one claims in dispute. The property lies between the Verde Central, Jerome Grande, and Walnut Springs mines, in the Jerome district. After disposition of this action suit for $210,000 damages was filed by the Arizona Jerome Copper Co. against County Recorder A. E. McSwiggin, L. S. Colwell, a former deputy recorder; Attorneys LeRoy Anderson and P. E. Lynn, A. E. Wideman, a broker; R. E. Moore, a real estate agent, and the Jerome Verde Copper Co. and others, alleging fraud in connection with the transfer of the mining claims.

Execution of a judgment granted to T. J. Ross for personal damages of $17,500 has been obtained against the property of the Kay Copper Co. in the Canon district, north of Phoenix. The operators state the judgment will be cleared in December. No work on the mine has been done for several months.

Jerome—Though no report has come from United Verde Extension officials, there is persistent rumor that a new body of ore, running well in gold, has been developed for more than 40 ft. on the Extension's 700 level and that values are bettering with each foot of progress. No report has been made recently of what was found under the Main Top orebody of the Jerome Verde Development property, though the fault is understood to have been cut a week or more ago.

On plans made by James M. Layman, consolidation of six Jerome properties, embracing in all 3,200 acres, may be effected. These are the Copper Chief, Equator, Copper Chief Extension, Layman-Washburn, Larson-Colbath, and Green Monster groups, to be merged into the Verde Consolidated Mine & Tunnel Co., which is to have a capitalization of $4,000,000 in 50c. shares. It is proposed to take in most of the ground in exchange for new stock, but $200,000 in cash is to be paid W. A. Clark and associates, who own the Equator. The same sum, in addition to a block of stock, is to go to the owners of the Copper Chief, the principal beneficiary to be W. S. Fulton, of Waterbury, Conn.

The Colbath-Larson ground is the old Monster Chief. It is said that the directors of the Green Monster do not favor the proposition. In the event of success, Layman proposes to run a long tunnel, which at 2,000 ft. would cut the Copper Chief ore at 1,500-ft. depth. This work is to be done under supervision of J. T. Matson, now superintendent of the Copper Chief.

Globe—The International smelter has finished smelting its stock of Miami concentrates, which it started on last fall when the bins of both mill and smelter had been filled.

The new Porphyry shaft of the Inspiration company, which was started last fall under contract with Jack Harrington, is approaching completion at a depth of about 1,240 ft. It is 14x18 ft.

Superior & Boston next month will start diamond drilling from the 1,200 level, to explore ground lying between the Great Eastern and Footwall faults. Drilling this ground was attempted before, but failed through improper handling. The mine has a force of 100 and is shipping thirty-three carloads of ore a month.

Ray Consolidated is looking for more Mexican miners and is reported preparing for full production, which would mean a daily output of 10,000 tons.

The Magma railroad grade is about half complete, and there is assurance that trains will be running into Superior on the broad-gage by the end of the year.

Kingman—The railroad strike recently affected mining in this locality considerably. A large number of men were laid off at Oatman, where the Tom Reed and United Eastern mills were stopped for a while for lack of power. Electric current is secured from the Desert Power Co., of Kingman, which was reduced to a few hundred barrels of fuel oil and which could guarantee power only for pumping and lights. Food also began to run short.

The Gold Chain in the Katherine section is to start excavation within a week for a 100-ton mill, 300 ft. east of the main shaft. Plans have been made by H. J. Kinkaid, formerly of Virginia City and Tonopah, recently appointed consulting engineer. Fine crushing is to be done by a Marcy mill.

New Iron Ore Deposits Reported Discovered in Germany

The *Berliner Boersen Zeitung* reports that extensive deposits of iron ore have been discovered at Adersheim and Fuemmelse, in the Wolfenbuettel district of Brunswick, according to Reuters Agency. The Brunswick authorities have granted the Schandelah concern, of Brunswick, a concession in the new fields of 1,841,778 square metres for the purpose of mining ore.

CALIFORNIA

Randsburg Active—Central Eureka Resumes—Keswick Still Alive—Gravel Mining—Outlaw Oil Companies

Special Correspondence.

San Francisco—Randsburg is unique among mining camps. Not less than seventy-five development plans are being carried forward; more than fifty headframes have been erected during the last eight months, and yet there is no indication of a boom. Bakersfield capital has financed about 80 per cent of the projects under way.

Operations have been resumed at the Central Eureka Mining Co.'s property in Sutter Creek, Amador County, after a shut-down of two months for repairs and improvements. Alterations have been made in the shaft, and a new concrete crusher house and ore bins have been installed. It is claimed that with the new equipment it will be possible to increase the tonnage going to the mill 25 per cent, besides effecting a considerable reduction in the operating cost per ton. Larger skips will also be used in the shaft so that the loads will be twice as large as at present. The mill, which was hung up while repairs were being made, started twenty of the forty stamps Aug. 14.

Development in mining is noticeable between Keswick and Shasta, in Shasta County. Two operators recently uncovered a promising vein between the two towns. They have now located eight more claims in the district, naming them Gold Jack, Gold Wedge, Bald Eagle No. 1 and 2, Sunset No. 1 and 2 and Golden Queen No. 1 and 2. The mines were known in pioneer days as the Gold Dollar group.

The Gruss Mining Co., now operating the Surcease mine, at Big Bar, will begin underground developments soon. It is planned to sink to the 150 level and block out ore for milling operations. The installation of electric equipment, compressor plant, new hoist, and headframe has been completed.

The Triple Lode mines at Angels Camp, Calaveras County, are to be developed with capital obtained by the sale of stock to New York and San Francisco financiers. A four-ton electric hoist will be installed and a new and larger headframe will be erected. The shaft is to be enlarged.

The owners of the Malakoff lease, near North Bloomfield, Nevada County, have decided to form a company, the development necessary having proved too large an undertaking for the existing partners. Following the strike of payable gravel in a shaft several months ago, developments have progressed to the point where the value of the property has been demonstrated. Drifts have been driven from the bottom of the shaft in gravel lying 29 ft. above the trough of the channel. The lease covers a channel area 2,000 ft. long and approximately 700 ft. wide. The depth varies, but is believed to average 20 ft. Plans call for sinking the shaft below the bottom of the channel.

NEVADA

White Caps Roaster Resumes; Mill to Follow—Tonnage Shipped from Pioche District Jumps

Divide—The Tonopah Divide mine during July shipped 1,618 tons of ore, with a gross value of $53,985. The Wilson Divide Mining Co. has taken over the Buckhorn property, at Stone Cabin, Nye County.

Tonopah—Reported bullion shipments representing the clean-up of operations during the first half of August are as follows: West End, $88,920; Tonopah Extension, $54,000; and Tonopah Belmont, $102,680. The Tonopah Mining Co. has not shipped as yet, but the clean-up will average less than the last one.

The Victor shaft of the Tonopah Extension will be continued to the 2,100 level, and crosscuts will be started from the 2,000 and 2,100 levels. The Tonopah Extension has announced a dividend of $69,235, making the total dividends to date $3,087,341.

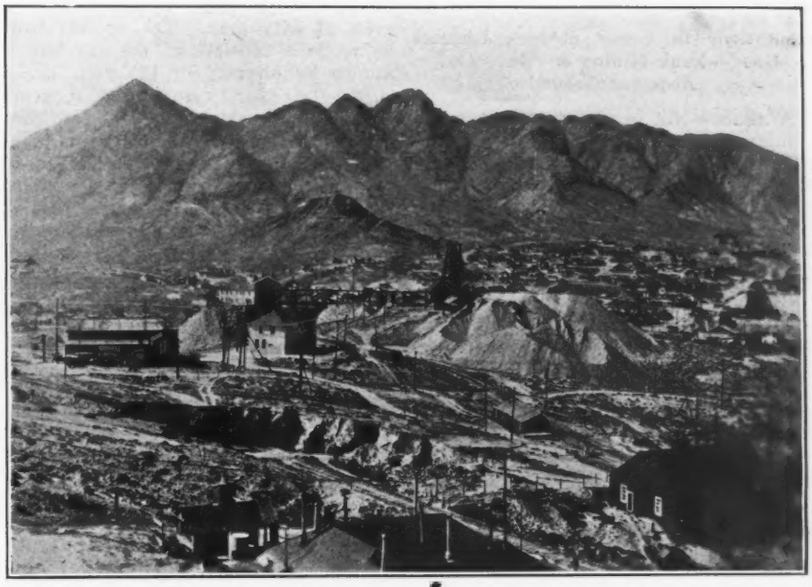
The Tonopah Belmont has opened up a large tonnage of fair milling ore above the 950 level of the Desert Queen shaft on the Mizpah Fault vein. The discovery adjoins the North Star ground.

Manhattan—The White Caps roaster resumed operations today at the rate of 100 tons of ore a day. The mill will be started in a few days with a new process of extraction.

Jarbidge—The Elkora Mines Co. made a net operating profit of $57,915 during the second quarter of the year.

Eureka—The Eureka Croesus is hauling 100 tons of ore a day for shipment to the Midvale smelter, Utah.

Granite—The ground where the gold strike east of Rawhide in Nye County was recently made has been taken under option by Superintendent Getchell of the Betty O'Neal Mines Co. and associates.



Scene at Tonopah, Nev. Hole in foreground was caused by caving of large stope in Mizpah ground of Tonopah Mining Co. recently

Silver City—The Oest mine has started operations with a complete surface equipment.

Goldfield—The Childers and Van Dornum lease on the Combination is reported to have a showing of high-grade gold ore.

Pioche—The tonnage brought in from the Bristol district the week ended Aug. 17 showed a decided increase. This increase was coupled with heavy shipments from both Bullionville and Dry Valley, making a production record unequaled for over a year, the total shipped for the week ended Aug. 17 being as follows: Prince Consolidated, tailings from Bullionville and Dry Valley, 1,250 tons; Bristol Silver, 540; Hillside Lease, 50; total, 1,840 tons.

A rich strike of ore was made on the Service claim in the old Tem Pahute mining district. M. A. White, working in an old cut near the summit of the range, opened up a 4-foot face of lead-silver ore. Only the richest ore is saved for shipment, on account of the distance from railroad. Two tons has been sacked which assay 550 oz. in silver and 45 per cent lead. In the Groom district, thirty-five miles south, a shipment of lead-silver ore is being hauled to Las Vegas. The ore is reported to carry 55 per cent lead and some silver.

Ely—Three cars of zinc ore were shipped by the Ely Calumet Mining Co. to the Utah Zinc Co. the week ended Aug. 17. The product assayed 34.5 per cent zinc. Further shipments will follow.

Close-up of cave-in on Tonopah Mining Co.'s ground. Wreck of assay office in bottom

Gold Production in Transvaal, India and Western Australia

By Cable from Reuters to Engineering and Mining Journal-Press

London, Aug. 12—Dispatches received from India, the Transvaal and Western Australia report production of gold during July as follows: India, 32,269 oz.; Transvaal, 730,635 oz., and Western Australia, 43,140 oz. The total reported was 806,044 oz.

Norwegian Pyrite Mines Unable to Resume Activities

By Cable from Reuters to "Engineering and Mining Journal-Press"

Christiania, Aug. 17—An announcement issued by the Rovstad mine owners states that notwithstanding substantial wage reductions the iron pyrites mines are unable to resume activity owing to the dullness of the world market.

IDAHO

Conditions in Coeur d'Alene District Good—Yaak Mining & Power Co. Acquires Ground

Wallace—Not in many years has the mining outlook been better in the Coeur d'Alene district than it is at this time, barring the labor shortage, which is expected to right itself as winter approaches, and the possible interference with shipments through the railroad strike. This is due not merely to the strong metal market that insures a good profit to the regular shippers, but also to the number of new mines entering or about to enter the producing class. One of these, the Success, has created quite a sensation during the past few weeks through the discovery of a new orebody which will evidently make a new mine of this old producer. While zinc has heretofore been the chief product of the Success, the new orebody is mainly lead-silver, a fact that has enabled the company to resume production after being closed down for three years on account of the unfavorable zinc market.

Another new producer is the Western Union, which for the last two years has been worked exclusively by leasers. The company took over the property on Aug. 1 and will operate the mine, having quite a large tonnage available of high-grade lead-silver ore and is carrying out development plans which are steadily increasing the ore reserves. The Lookout Mountain is rapidly approaching the productive stage. This property is unique in the fact that it is situated in the heart of the Pine Creek section where zinc-lead ores prevail, yet Lookout Mountain has high-grade lead-concentrate and lead-sulphide ore without a trace of zinc. Among the near mines may be mentioned the Galena, controlled by the Callahan Zinc-Lead Co., which is systematically developing a large tonnage of lead-silver ore. The Independence is another property that is attracting much attention. It is situated between the Morning and Hunter mines, joining both. The Morning and You Like veins pass through it, and the latter is being developed with most satisfactory results, a large body of milling ore having been exposed. These new developments, together with the recent resumption of the Day mines, the steady operation of all other large producers and the strong market for metals, combine to give decidedly bright outlook to mining in the Coeur d'Alenes.

Bonners Ferry — The Cynide Gold Mining Co., which has been developing the old Buckhorn mine, in the northeast corner of Boundary County, for the past three years, and is now installing a cyanide mill, has disposed of 1,600 acres of placer ground on the Yaak River to the Yaak Mining & Power Co., recently formed. This company has acquired additional ground, making a total of approximately 10,000 acres of placer territory which it is proposed to develop.

Hailey — The Consolidated Mascot Mines Corporation is employing a crew of fifty men. The outside work being done consists of the erection of a new bunkhouse for 100 men, and a 10,000-ft. capacity sawmill. A semi-Diesel oil burning engine for compressor and electric plant drive is being installed. A loading spur is to be put in at Gimlet, on the Oregon Short Line R.R., with a view to facilitating shipments to and from the mine.

SOUTH DAKOTA

Trojan Company Working Two Johns Mine—Richmond-Sitting Bull Resumes

Deadwood—The Eagle Bird tunnel has been driven a distance of 1,300 ft. and will be completed this year. It is being driven from creek level to cut the ore that outcrops and will give a depth of about 400 ft.

Work has been resumed at the Two Johns mine of the Trojan company. A diamond drill has been installed, and active development will follow. The other mines of the company continue active, and the production is nearly back to normal. C. E. Dawson, formerly assistant manager, has been placed in charge as manager.

A 6x6 Marcy mill has been installed at the property of the Golden Feather mine. Other installations are being rushed and it is hoped to have the plant in operation before the first of the year. Amalgamation and concentration will be used.

At the Rattle Snake Jake mine development work is being done. A two-compartment shaft is being sunk.

At the Golden Crest, work continues in the mine. The plant will not be placed in operation this year.

Galena—Work has started on the Richmond-Sitting Bull mine. This property, which has been idle for many years, was once the largest silver-lead producer in the Black Hills, and a considerable tonnage of high-grade material was shipped to the smelter for treatment. Most of the ore was taken from the second contact, and the deposits were large. This level has been opened by miles of underground work, and most of the rich material has been removed. The present development will be done on the third contact, heretofore untouched. Much interest is taken in the work, for the occurrence of ore at this lower depth will mean the revival of operations throughout the district. The owners, Barton and Clark, of Omaha, Neb., plan on continuing the work just started until the lower depths have been thoroughly explored. Robert Scholt, formerly superintendent of the New Silver Queen mine, has been placed in charge.

Lead—The New South mill of the Homestake Mining Co. is nearing completion and it is expected that one section will be placed in operation by Oct. 1. The remaining five sections will be added as completed, and in several months' time the new plant will be in operation with a daily capacity of 1,800 tons.

COLORADO

Metals Exploration Co. Takes Over Tiger-Shields—Portland Gold Mining Co. Elects New President

By Our Special Correspondent

Leadville—In line with the general increase of mining activity throughout the state, the Metals Exploration Co., of which Bulkeley Wells is one of the moving spirits, has taken over the Tiger-Shields property, on Sugar Loaf Mountain, which will be subjected to thorough examination and extensive prospecting. The property has been inactive for many years, principally on account of litigation which tied up royalties amounting to $63,000, resulting in a series of lawsuits involving an unsavory scandal affecting court officials and attorneys.

J. C. Ingersoll, a member of the engineering staff of the Metals Exploration Co., is in charge of the work. Explorations will be conducted through an old tunnel which is being cleared out and retimbered. New buildings are being constructed and new machinery installed to facilitate operations.

The South Ibex company, under the management of John Cortellini, has started the sinking of a new shaft, to be 360 ft. deep, to connect with an orebody discovered in a half-mile drift from the Garbutt shaft.

The Down Town Mines Co., which recently resumed operations, is now working forty-five men and shipping lead and zinc ores to the local oxide plant and smelter.

Cripple Creek—Twelve sets of leasers are now working on the Elkton, and the output is two cars daily. It is expected that production will be doubled within the next thirty days. Plans are being made for operation on company account, and predictions are being made of a come-back of the famous old dividend payer.

Irving Howbert, president of the First National Bank of Colorado Springs and chairman of the board of directors of the Portland Gold Mining Co., has been elected president to succeed the late Frank G. Peck, who served as president for many years. Plans are being considered for the reopening of the Independence low-grade mill within the next few weeks. The strike on the 2,600 level has now been drifted on for 250 ft., cutting for a new veing, and is showing well.

WASHINGTON

More Ore Found in Old Dominion Mine —Daisy Mine to Have Mill

Daisy—The Silver Mountain Mining Co., operating the Daisy mine four miles east of Daisy on the divide between the Columbia River and Colville valley, is developing the No. 1 vein on the 400 level. The values are in lead-silver and the vein on this level is 4 ft. wide, averaging $9 per ton. A crosscut has just been started to cut the Carmody vein on the same level at 60 ft. If the vein shows as good values as were encountered on the Terry level 130 ft. above the company will immediately

begin construction of a fifty-ton concentrator.

Colville—The Chloride Queen Mining Co. located on Clugston Creek, fifteen miles north of Colville, is in 1,200 ft. in the lower tunnel and has reached a depth of 750 ft. from the surface. One vein has been found in the tunnel that is 20 ft. wide, carrying lead and silver. The lower tunnel will be driven 200 ft. farther to develop a surface showing of lead-silver ore about 10 ft. wide.

More ore was discovered Aug. 10 in the Old Dominion mine. It assayed 400 oz. silver. The extent of the new find has not yet been determined, but indications are that the orebody is of considerable size.

UTAH

Park-Utah Heads Park City Shippers —New Power Line for Tintic District

Eureka—Ore shipments from the Tintic district for the week ended Aug. 19 were 157 cars. Shippers were: Chief Consolidated, 50 cars; Tintic Standard, 35; Iron Blossom, 15; Victoria, 12; Grand Central, 11; Colorado, 8; Eagle & Blue Bell, 6; Swansea, 5; Mammoth, 4; Tintic Drain Tunnel, 3; Gemini, 2; Dragon, 2; Centennial-Eureka, 1; Bullion Beck, 1; Eureka Metallurgical, 1; and Sunbeam, 1. In addition to its ore shipments, the Chief Consolidated shipped 27 cars of limestone from its Homansville quarry. During the first half of 1922 this company has done approximately five miles of development work on its properties, not including the Grand Central, which is being operated as a separate corporation. In 1921, the Chief did 41,323 ft. of development work or about eight miles. At the Grand Central, work has been resumed after a shutdown of about a week, during which time electrical equipment for the hoist was installed. It is expected in the near future to install the new 2,500-cu.ft. compressor.

The Tintic Milling is doing good work. It is receiving most of its ores from the Iron Blossom, Dragon, Colorado, and Swansea properties, all of which are controlled by the Knight interests.

The Utah Power & Light Company is building a new power line from Santaquin into the Tintic district. This will come through to Eureka by way of the Tintic Standard, and is expected to be completed in about three months.

Park City—Shipments for the week ended Aug. 19 were 3,440 tons as compared with 3,829 tons the week preceding, the falling off being due to decrease in shipments by the Ontario, which has been shipping heavily from its tailings dump. Shippers were: Park-Utah, 1,014 tons; Silver King Coalition, 834; Judge and the Park City M. & S., 811; and Ontario, 782. It is of interest that Park City's newest producer, the Park-Utah, heads the list. This company is completing the electrification of the Ontario drain tunnel, through which it is operating.

MICHIGAN

The Copper Country

Fewer Men Leaving Mines—Geological Survey of District for C. & H. Now in Third Year

BY M. W. YOUNGS

Houghton—With the waning of summer the exodus of underground men from the mines of the Michigan copper district is not so pronounced, and a marked change in the labor situation is expected within the next two months. Not only is there a possibility of the return of former miners temporarily employed in the automobile and other industrial plants, but farmers likewise will be returning to the mines as soon as the harvest season ends. A large number of farmers on the 2,000 small farms in the district work underground in the fall and winter months.

August metal business is holding up well as compared with the preceding summer months and it is expected that deliveries will be fully as large as in July or June, when over 10,000,000 lb. was shipped. Judging from orders at hand, however, there will be a falling off in September of several million pounds. Domestic consumers continue to be heavy buyers of Lake copper, the foreign shipments being comparatively small. At the Calumet & Hecla smelter, twelve furnaces are in operation, two of which are smelting cupola blocks for the electrolytic plant. The smelter force now numbers 350 men, on full time.

Mohawk continues to produce approximately 60 per cent of normal, the reduction being due to loss of men. Mohawk and Wolverine together are using four stamps at the mills. Ground averaging 22 lb. to the ton is being mined in Nos. 4 and 6 shafts, Mohawk, and new openings continue good. Much rock still remains to be taken out of the upper levels of both shafts, as the levels are not widened out to the full extent of the mineralization. The vein bulges in No. 4 shaft below the 20th level and from the 20th to the 25th is fully 40 ft. in width. This means that large blocks of ground will be available later when the levels are widened from the foot to the hanging.

The new hoist and compressor and two of the four boilers to be installed are being set up at Gratiot No. 2 shaft, Seneca. In the shaft, the skip-road is being cemented at the thirteenth or bottom level preparatory to resumption of sinking. Drifts north from the thirteenth and south from the eleventh levels are in rock well up to the average of the Kearsarge lode. Splendid ground also continues to be opened in all drifts north toward Gratiot from the Seneca shaft, from the 3rd to the 7th levels. Selected rock is returning over 30 lb. to the ton in tonnage stamped. Preparations are under way to complete railroad connections between the shafts and the Mineral Range railroad this year.

The geological survey being conducted for the Calumet & Hecla is now in the third year and while its main purpose has not yet been accomplished, the results to date have fully justified the venture and assure the saving of a great deal of money in future operations. The presence of copper in paying quantity is associated with certain geological elements, and these elements have been fairly well established. It will be possible, then, to determine whether or not to proceed with development or mining operations in hand. Whether or not it ever will be possible to follow the course of a lode and determine the stretches in which commercial copper may be found is not yet known. The majority of the mining companies are co-operating with the Calumet & Hecla in carrying out the survey, to the extent of permitting access to underground openings and offering use of facilities for such benefits as accrue from the investigation will be for the entire district and not for Calumet & Hecla alone. It is in no way a selfish enterprise but for the good of all. Exploratory work by diamond drill is far from satisfactory.

NORTH CAROLINA

Coggin Mine Shuts Down Temporarily —Iola Property Sold

Ashboro—Donald Cameron is sinking a shaft at the Porter mine, in a good vein. Recent milling tests of old dumps have yielded high-grade concentrates.

At the Spoon mine, work has been resumed and the shaft is being deepened.

Troy—The Coggin mine has stopped work temporarily at least, on account of the death of R. P. Richardson, the owner, who had been engaged in the development of this property for ten years. He recently purchased the old Russell mine and started development. These were the most important gold-mining operations in the state, and Mr. Richardson had planned an active campaign of development that now may not be undertaken.

The Iola mine, ten miles from Troy, has been sold to H. S. Souder, of Souderton, Pa. Mr. Moyer is in charge and has been operating a Jobson centrifugal amalgamator on dump material. A second amalgamator has recently been put up and will treat pulp from a ten-stamp battery built here two years ago when the property was operated by the Carolina Mineral Co. Some development work is to be done on a new vein recently uncovered on the property.

Hemp—The talc (pyrophyllite) mine and mill of the Standard Mineral Co. are now operating regularly, under the direction of the superintendent, Charles F. Gerhardt. Fine talc and the roofing grade are being produced. A shaft has been sunk from the bottom of the open cut here, and mineral is now being mined underground. The shaft is to be deepened another hundred feet.

THE MARKET REPORT

Daily Prices of Metals

Aug.	Copper, N. Y., net refinery* Electrolytic	Tin 99 Per Cent	Tin Straits	Lead N. Y.	Lead St. L.	Zinc St. L.
24	13.625@13.75	32.125	32.25	5.90	5.55@5.60	6.20@6.25
25	13.625@13.75	31.75	32.00	5.90	5.55	6.20@6.25
26	13.625@13.75	31.875	32.125	5.90	5.55	6.20@6.25
28	13.625	32.00	32 125	5.90	5.55	6.20@6.25
29	13.625	32.125	32.375	5.90	5.55	6.20@6.25
30	13.625	32.375	32.625	5.90	5.55	6.20@6.25

*These prices correspond to the following quotations for copper delivered: Aug. 24, 25, and 26, 13.875@14c.; Aug. 28 to 30 inc., 13.875c.

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York cash, except where St. Louis is the normal basing point, or as otherwise noted. All prices are in cents per pound. Copper is commonly sold "delivered," which means that the seller pays the freight from the refinery to the buyer's destination.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. Tin is quoted on the basis of spot American tin, 99 per cent grade, and spot Straits tin. Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

London

Aug.	Copper Standard Spot	Copper Standard 3M	Copper Electrolytic	Tin Spot	Tin 3M	Lead Spot	Lead 3M	Zinc Spot	Zinc 3M
24	62⅜	62½	69	158¾	159	24	23⅛	30¾	30⅛
25	61⅝	61¾	68	157⅝	157⅞	23⅜	22¾	30⅛	29½
28	62	62¼	68½	158½	158½	23¾	23	30⅝	30⅛
29	62½	62¾	68¾	159½	159¾	24	23⅜	30⅞	30⅜
30	62⅞	63⅛	69	160⅜	160⅝	24⅛	23½	30¾	30¼

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

Silver and Sterling Exchange

Aug.	Sterling Exchange "Checks"	Silver New York Domestic Origin	Silver New York Foreign Origin	Silver London	Aug.	Sterling Exchange "Checks"	Silver New York Domestic Origin	Silver New York Foreign Origin	Silver London
24	4.47	99⅛	69½	35⅛	28	4.45⅞	99⅛	69⅝	35⅛
25	4.47½	99⅝	69½	35⅛	29	4.45½	99¼	69½	35⅛
26	4.46⅝	99⅛	69⅞	35¼	30	4.45½	99⅛	69⅝	35⅛

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine. Sterling quotations represent the demand market in the forenoon. Cables command one-quarter of a cent premium.

Metal Markets

New York, Aug. 30, 1922

The week has again been a quiet one in the metal markets, though prices have held fairly steady. Producers generally have not been inclined to lower prices to consummate sales, feeling that conditions at present are disturbed and that the market will improve next month. The rail shopmen's strike is now thought to be lost, and it is likely that sufficient men can be recruited to carry on the work. The coal strike still seems serious and causes metal buyers to be cautious.

Copper

The copper market has been practically at a standstill during the last week, with few offers by producers as well as few inquiries. Most producers are holding firm at 14c. delivered, being comfortably situated as regards stocks and perfectly willing to wait several weeks if necessary for demand to manifest itself again. In one or two directions, however, there has been an effort to sell, but the best price that could be realized was 13.875c. delivered. A few orders were placed during the last few days at that level. Foreign demand has also been light and confined to miscellaneous business of small individual tonnage.

Production at the mines has not been as great as expected owing to a shortage of skilled men, such as miners and shopmen. It is likely, however, that the porphyries are operating at not far from the 50 per cent capacity that they intended to reach when operations were resumed last spring.

There seems to be too much of a tendency to compare present copper production with the war peak rather than with conditions as they existed before the war. This is manifestly unfair, and a comparison of the total sales of copper by the various Eastern selling agencies in 1914 with those of the present should therefore be enlightening. The following totals represent thousand-pound units.

	Export	Domestic	Total	Price
1914				
June	73,350	46,227	119,577	13.6
July	56,377	42,094	98,471	13.2
Total	129,727	88,321	218,048	
1921				
June	43,744	45,444	89,188	12.7
July	53,758	36,960	90,718	12.2
Total	97,502	82,404	179,906	
1922				
June	73,992	102,782	176,774	13.6
July	69,288	103,130	172,418	13.7
Total	143,280	205,912	349,192	

The domestic business during June and July of the present year is thus seen to be 259 per cent of what it was in the same months of 1914, and the export business 111 per cent, or the total, 160 per cent. This despite the fact that the European nations were supposed to be preparing for war in 1914, and laying in large stocks of copper. Therefore, although present prices are much lower than the general commodity level, the volume of sales must be regarded as encouraging considering the unsettled condition of European finance. It must be admitted however, that the summer of 1914 was a very quiet one in the copper market, with consumption not equal to production.

Lead

The official contract price of the American Smelting & Refining Co. continues at 5.90c. per lb., New York.

The market has been quiet, particularly in the East, where all premiums over Smelting company's price seem to have disappeared, except perhaps on spot business by dealers. The St. Louis market has been somewhat more active, but practically all the business has been done by the one interest willing to sell at 5.55c. Others are holding generally for at least 5.60c. and more generally 5.625@5.65, but are doing little or nothing at those levels except for

desilverized lead. Consumers are still doing an active business, particularly those making paint, storage batteries, and lead-covered cable. The storage-battery business seems to be keeping up remarkably well, some makers demanding more lead than their contract quotas.

Zinc

The strikes have interfered with zinc business more than with sales of the other metals, black sheets being difficult to obtain, and the galvanizing demand therefore being small. Still, sales have been fairly good, prices being steady for the week at 6.25c. for carload business, a little of which was booked every day, and 6.20c. for a few larger orders, the tonnages changing hands at each level about counterbalancing. High-grade continues at 7@7.25c. with freight allowed. Prime Western in New York continues at the freight differential of 35 points above the St. Louis level. Brass special grades are quoted at 10 to 12½ points' premium.

Tin

Tin inquiries have been better lately, and yesterday the market was quite active, several consumers buying. American electrolytic has been in rather small demand at prices equivalent to Straits. Chinese No. 1 has been sold at a slight discount from the price asked for 99 per cent American tin, as represented in our quotations. Tin for forward delivery, ⅛c. premium.

Arrivals of tin, in long tons: Aug. 23, China, 50; Straits, 425; 24th, Straits, 25; 25th, Straits, 10; 28th, China, 160; 29th, Java, 105.

Gold

Gold in London: Aug. 24, 92s. 2d.; 25th, 92s. 2d.; 28th, 92s. 3d.; 29th, 92s. 7d.; 30th, 92s. 4d.

Foreign Exchange

The week has been characterized by increased strength in sterling and weakness in marks. Sterling has been aided by purchases of fuel for delivery in this country and by purchases of goods on which a high tariff is expected to be placed later. Many believe that sterling will reach par this year. England so far is the only one of the war-torn countries that has been able to balance her budget. After four years of peace, financial conditions in most of the other countries are decidedly unsettled and will probably remain so until England and the United States take a hand in straightening out the difficulties. On Tuesday, Aug. 29, francs were 7.80c.; lire, 4.44c.; marks, 0.0925c.; and Canadian dollars ⅛ per cent discount.

Silver

The London market has been steady, but very narrow and dull. New York has also been steady, but there has been a fair amount of business, particularly for San Francisco delivery. Silver closes quiet.

Mexican Dollars—Aug. 24, 53⅛; 25th, 53⅛; 26th, 53⅜; 28th, 53¼; 29th, 53⅛; 30th, 53¼c.

Other Metals

Quotations cover large wholesale lots, f.o.b. New York, unless otherwise specified.

Aluminum—20.10c. per lb. for 99 per cent grade; 19.10c. for 98@99 per cent; 18c. for 94@98 per cent. Outside market nominal at 17.75@18.25c. for 98@99 per cent virgin grades.

Antimony — Chinese and Japanese brands, 5.375c.; strong. W. C. C., 6@6.25c. Cookson's "C" grade, spot, 7@7.25c. Chinese needle antimony, lump, nominal, 4@4.50c. per lb. Standard powdered needle antimony (200 mesh), nominal at 5½c. per lb. White antimony oxide, Chinese, guaranteed 99 per cent Sb_2O_3, 6.75@7c.

Bismuth—$2@$2.10 per lb.

Cadmium—$1.20@$1.25 per lb.

Cobalt—Metal, $3@$3.25 per lb.; black oxide, $2 per lb. in bbls.

Iridium—Quotations nominal. Metal exceedingly scarce.

Magnesium—Sticks, 1⅛ in., 99.9 per cent, $1.25 per lb.

[1]**Molybdenum Metal**—In rod or wire form, 99.9 per cent pure, $32@$40 per lb., according to gage. Powder, 95 per cent, $5 per lb.

Monel Metal — Shot, 32c.; blocks, 32c. per lb., f.o.b. Bayonne, N. J.

Nickel—Standard market, ingot and shot, 36c.; electrolytic, 39c. Outside market quiet at 32@34c. per lb.

Osmium — No quotation reported. Recently $70 per troy oz.

Palladium—$55 per oz.

Platinum—$108 per oz. Scarcity of metal.

Quicksilver—$60 per 75-lb. flask, San Francisco wires $60. Strong.

[1]**Rhodium**—$100@$115 per troy oz.

[1]**Selenium**—Black powdered, amorphous, 99.5 per cent pure, $1.80@$1.90 per lb.

[1]**Thallium Metal**—Ingot, 99 per cent pure, $18@$20 per lb.

[1]**Tungsten Metal**—Powder, 97 to 98 per cent, 45@60c. per lb. contained tungsten.

Metallic Ores

Chrome Ore—Indian chrome ore at $18 per ton, c.i.f. Atlantic ports. Rhodesian and New Caledonian, $23 and $25 per ton. Market quiet.

Iron Ore—Lake Superior ores, per long ton, Lower Lake ports: Old Range bessemer, 55 per cent iron, $5.95; Mesabi bessemer, 55 per cent iron, $5.70; Old Range non-bessemer, 51½ per cent iron, $5.20; Mesabi non-bessemer, 51½ per cent iron, $5.05.

Magnetite Ore—F.o.b. Port Henry, N. Y.: Old bed 21 furnace, $4.50 per long ton; old bed concentrates, 63 per cent, $5.25; Harmony, cobbed, 63 per cent, $5.25; new bed low phosphorus, 65 per cent, $7.50.

Manganese Ore—29c. per long ton unit, c.i.f. seaport.

Molybdenum Ore—45@50c. per lb. of MoS_2, for 85 per cent MoS_2 concentrates.

Tantalum Ore—Hand-sorted ore, 70 per cent combined columbite-tantalite, 40c. per lb., South Dakota.

[1]**Titanium Ores**—Ilmenite, 52 per cent TiO_2, 1½@2c. per lb. for ore. Rutile, 96 per cent TiO_2, 9@10c. per lb. for ore, with concessions on large lots or contracts.

Tungsten Ore—Chinese ore, $3@$3.50 per long ton unit of WO_3.

Uranium Ore (Carnotite)—Ore containing from 2 to 2½ per cent U_3O_8, $3.50 per lb. of contained U_3O_8.

Vanadium Ore—No quotation. Recently $1 per lb. of V_2O_5 content.

Zircon — Zirconium silicate, f.o.b. Pablo, Fla., 4½@13c. per lb.

Zinc and Lead Ore Markets

Joplin, Mo., Aug. 26.—Zinc blende, per ton, high, $38.45; basis 60 per cent zinc, premium, $37@$38; Prime Western, $36; fines and slimes, $35@$33.50; average settling price, all grades of blende, $36.86; calamine, $20@$22.50, basis 40 per cent zinc.

Lead, high, $83.15; basis 80 per cent lead, $80; average settling price, all grades of lead, $80.59 per ton.

Shipments for the week: Blende, 8,027; calamine, 125; lead, 1,863 tons. Value, all ores the week, $448,702.

Shipments for eight months: Blende, 301,011; calamine, 1,073; lead, 59,517 tons. Value, all ores eight months, $13,196,320.

Shippers are protesting strongly about a shortage of cars, but looking back over the last four years the August supply this year, compared with the supply of cars during the first eight months of each year, is within 90 per cent of the normal August supply.

Platteville, Wis., Aug. 26.—Blende, basis 60 per cent zinc, $38; lead, basis 80 per cent lead, $81. Shipments for the week: Blende, 1,103 tons; lead, none. Shipments for the year: Blende, 11,697; lead, 1,129 tons. Shipments during the week to separating plants, 748 tons blende.

Non-Metallic Minerals

Asbestos—No. 1 crude, $700@$750 per ton, f.o.b. Quebec mines; No. 2, $350@$450; long spinning fibre, $200@$300; spinning fibre, $175@$300; shingle stock, $65@$100; paper stock, $27.50@$35; cement stock, $14@$17: floats and shorts, $8.

Barytes—Washed crude ore, 92 per cent $BaSO_4$ guaranteed, $8 per long ton, Georgia; $9, New York. Ground, off-color, No. 1 grade, $20, New York; No. 2, $15.

Bauxite—American, crushed and dried, $6@$9 per gross ton; pulverized and dried, $12@$14 per gross ton; calcined, $22@$25 per gross ton, all f.o.b. shipping points. Foreign bauxite offered at $5@$8 per metric ton, c.i.f. Atlantic ports, depending upon grade.

[1]Furnished by Foote Mineral Co., Philadelphia, Pa.

Borax—Granulated and refined, crystals or powdered, in bags, carloads, 5¼c. per lb.; in bbls., 5½c. Boric acid, 11c.

Chalk—English, extra light, 5c. Domestic light, 4¼@4½c.; heavy, 3½@3¾c. per lb., all f.o.b. New York.

China Clay (Kaolin)—Crude, $6@$8; washed, $8@$9; powdered, $12@$20; bags extra, per net ton, f.o.b. mines, Georgia; powdered clay, $13@$20, f.o.b. Virginia points. Imported lump, $13@$18, f.o.b. American ports; powdered, $35@$45, f.o.b., New York. 1A grade, refined, $13.50@$15 per ton, Delaware.

Emery — Turkish and Greek manufactured emery, 6@8c. per lb. American, 4@6c. Inferior grades, 3½c., f.o.b. New England points.

Feldspar—No. 1 pottery grade, $6.50@$7.50 per long ton; soap grade, $7, f.o.b. North Carolina points. Ground to 140 mesh, $16.50 per ton; 40 to 100 mesh, $10, f.o.b. mill. Canadian $20, f.o.b. cars at mill. No. 1, $7.50, No. 2, $6.50, f.o.b. Connecticut points.

Fluorspar—Gravel, $17.50@$20 per ton, f.o.b. mines in Middle West. Acid, $40@$45 in bulk. For enameling and glass uses, $35@$40. Imported acid grades, $21, f.o.b. Atlantic seaboard.

Fuller's Earth—16 to 30 mesh, $17 per ton; 30 to 60 mesh, $20; 60 to 100 mesh, $18; 100 mesh and finer, $10; f.o.b. Florida mines. Market 50 to 60 per cent of normal.

Graphite—Ceylon lump, first quality, 5@5½c. per lb.; chip, 4@4½c.; dust, 3½@3¾c. Mexican crude amorphous, $15@$35.

Gypsum—Crushed rock, $3 per ton in most states. Ground, $3.50@$4, f.o.b. shipping points.

Kaolin—See China Clay.

Limestone—Crushed, New York State shipping points, ¾ in. and larger, $1.10@$1.35 per net ton. Agricultural limestone, $2.50@$3 net ton, f.o.b. eastern shipping points.

Magnesite—Crude, $8@$12 per ton. High-grade caustic calcined, lump form, $30@$45 per ton. Plastic calcined, $45@$50 in bbls., carload lots, f.o.b. California points. Atlantic seaboard, $60.

Dead-Burned — $33 per net ton, Chewelah, Wash.; $58@$64, Chester, Pa. Austrian grains, $30 per ton, f.o.b. Baltimore. Industry on Pacific Coast inactive. Prices of American grades nominal. (Magnesite brick—See Refractories.)

Mica—India block mica, slightly stained, per lb.: No. 6, 35c.; No. 5, $1.25; No. 4, $2.25; No. 3, $2.90; No. 2, $4; No. 1, $5.20. Clear block: No. 6, 50c.; No. 5, $1.75; No. 4, $3; No. 3, $4.75; No. 2, $6; No. 1, $7.50; A1, $9; ground, wallpaper grade, $90@$200 per ton (depending upon quantity); ground roofing mica, $25@$70, all f.o.b. New York. Water-ground mica, 160 and 200 mesh, 6½@8c. per lb., f.o.b. Virginia points.

[1]**Monazite**—Minimum 6 per cent ThO_2, 6@8c. per lb.

Phosphate Rock—Per long ton, Florida ports, pebble grade, for export: 77 per cent tricalcium phosphate, $7.50 ($8.50 for hard rock); 75 per cent, $6.50; 70 per cent, $4.50; 68@66 per cent, $4.25. 72 per cent B. P. L., $6.50 per long ton, Tennessee.

Pumice Stone—Imported lump, 3@40c. per lb.; domestic lump, 5c.; ground, 5@6c., all f.o.b. New York.

Pyrites—In boulder form, $7 per long ton, f.o.b. Massachusetts; concentrates, $9 per long ton.

Silica—Glass sand, generally $1.75@$2.50 per ton, f.o.b. shipping point; sand-blast material, $2.50@$5. Ground 250 to 450 mesh, $17@$40, f.o.b. mills. Glass sand $5@$10, f.o.b. Massachusetts.

Sulphur—$16@$18 per ton for domestic, f.o.b. Texas and Louisiana mines; $18@$20 for export, f.a.s. New York.

Talc—200 to 300 mesh, including containers, $14.25@$14.75, f.o.b. New York state mills; 20 to 50 mesh, $7.50; 150 to 200 mesh, $9@$14 per ton, f.o.b. Vermont points; $1 extra for bags; 200 mesh, $18; 300 mesh, $25, f.o.b. California points. Powdered talc in Georgia, $8.25@$11 per ton. Market has improved.

Mineral Products

Arsenious Oxide (White Arsenic)—8.5c. per lb. with asking prices up to 9c. Demand active from all classes of consumers.

Copper Sulphate—Large crystals, 6.25c. per lb. Prompt shipment scarce.

Potassium Sulphate — Powder, domestic, $1 per unit, basis 90 per cent, f.o.b. New York.

Sodium Nitrate—$2.50 per 100 lb., ex vessel Atlantic ports.

Sodium Sulphate—$20@$25 per ton, New York.

Ferro-Alloys

Ferrocerium—Per lb., $15@$20.

Ferrochrome—1 to 2 per cent carbon, 25c. per lb.; 4 to 6 per cent carbon, 10½c. per lb.

Ferromanganese — Domestic, 78@82 per cent, $67.50 per gross ton, f.o.b. furnace. English, $67.50, c.i.f. Atlantic seaports. Spiegeleisen 19@21 per cent, $39, f.o.b. furnace; 16@19 per cent, $38.

Ferromolybdenum—$2@$2.50 per lb. of contained molybdenum for 50 to 55 per cent grades.

Ferrosilicon—10 to 15 per cent, $38@$40 per gross ton, f.o.b. works; 50 per cent, $58@$60; 75 per cent, $115@$120.

Ferrotitanium—For 15 to 18 per cent material, $200@$225 per ton, f.o.b. Niagara Falls, N. Y.

Ferrotungsten — Domestic, 70 to 80 per cent W, 45@50c. per lb. of contained W, f.o.b. works. Improving.

Ferro-uranium—35 to 50 per cent U, $6 per lb. of U contained, f.o.b. works.

Ferrovanadium—$3.50@$4 per lb. of V contained, f.o.b. works.

[1]Price furnished by Foote Mineral Co., Philadelphia, Pa.

Metal Products

Copper Sheets — New York base, 21c. per lb.; wire, 15.50@15.75c.

Lead Sheets—Full lead sheets, 8.75c.; cut lead sheets, 9c. in quantity, mill lots.

Nickel Silver—28c. per lb. for 18 per cent nickel Grade "A" sheets.

Yellow Metal — Dimension sheets, 18.75c.; rods, 15.75c.

Zinc Sheets—$7.75 per 100 lb. less 8 per cent on carload lots, f.o.b. works.

Refractories

Bauxite Brick—$50 minimum, per net ton, f.o.b. St. Louis.

Chrome Brick—$42 per net ton, f.o.b. shipping point.

Chrome Cement — $23 per net ton, f.o.b. shipping point.

Firebrick—First quality, 9-in. shapes, $32@$35 per 1,000, Pennsylvania, Ohio, Illinois, and Kentucky.

Magnesite Brick — 9-in., straights, $56 per net ton, f.o.b. works.

Magnesite Cement—$35 per net ton, f.o.b. shipping points.

Silica Brick — 9-in., per 1,000, $46, f.o.b. shipping points.

[1]**Zirkite**—Powdered, $50@$60 per ton; brick, $100 per ton.

The Iron Trade

Pittsburgh, Aug. 29, 1922

On Aug. 23 Connellsville coke operators posted notices restoring the wage scale of Sept. 1, 1920, that having been the highest scale in the history of the region. No union recognition, of course, was offered. There has been no notable response to the offer, rather to the surprise of most observers of conditions.

The iron and steel industry is not benefiting to any extent from the increasing production of coal in union fields, as the coal goes for more important uses. An entirely new spirit pervades the pig iron and steel markets. A decision has evidently been reached not to absorb the increases in costs due to the high demands of labor, but to let matters take their course, and not to anticipate industrial and price readjustments.

Following the advance of independent pipe mills, the National Tube Co. has advanced its prices approximately $6 a ton on black and $4 a ton on galvanized, covering merchant pipe, boiler tubes, and oil-country goods. The minimum on bars has advanced from 1.80c. to 1.90c. and on shapes and plates from 1.80c. to 2c. while 2.25c. is readily obtained on early deliveries.

Pig Iron—Small lots of bessemer have gone at $32, Valley, advancing the market $2. Basic is not obtainable at under $30, Valley, or $4 advance. No foundry iron seems to be offered nearer than Buffalo, making a Valley equivalent of about $33.

Connellsville Coke—Prices have been declining, demand remaining light while offerings are slightly increased. Furnace, $10@$11; foundry, $13@$14.

COMPANY REPORTS

Lake Shore Mines, Ltd.

A report of operations of the Lake Shore Mines for the year ending Nov. 30, 1921, shows a net profit of $51,723.94, according to the following profit and loss account:

Income		
Bullion production (gold, Ontario)	$460,186.37	
Exchange on bullion sales	63,411.02	
		$523,597.39
Interest on Victory Bonds	$2,750.00	
Interest on bank accounts	589.48	
		3,339.48
		$526,936.87
Expenses		
Operating expense, development, mining, milling, maintenance, general expense. Ontario mining taxes (after deducting sundry revenue)	$289,943.58	
Administration expense	7,342.01	
Depreciation	33,714.84	
Exchange on dividend cheques	14,212.50	
		$345,212.93
Profit before providing for exhaustion and Dominion government taxes		$181,723.94
Provision for exhaustion	$120,000.00	
Provision for Dominion government taxes	10,000.00	
		130,000.00
Net profit		$51,723.94

Balance sheet as of Nov. 30, 1921, is given as follows:

ASSETS		
Cash and bank balances	$97,111.96	
Bullion products on hand	89,625.95	
Accounts receivable	2,534.60	
Supplies on hand	41,075.52	
Deposits and prepaid expenses	1,997.50	
Victory Bonds (cost)	50,000.00	
		$282,345.53
Buildings, structures and equipment	$296,556.01	
Less	115,418.73	
		181,137.28
Mining properties	$1,021,510.60	
Development and organization expense	201,127.40	1,222,638.00
Less provision for exhaustion		390,000.00
		$832,638.00
Insurance reserve fund		3,324.94
		$1,299,445.75
LIABILITIES		
Accounts payable	$15,141.96	
Salaries and wages	5,491.02	
Accrued charges	7,503.60	
Provision for contingencies, Dominion government taxes, etc.	26,074.83	
		$54,211.41
Insurance reserve		3,324.94
Capital stock	$2,000,000.00	
Less discount on shares	667,797.00	
	$1,332,203.00	
Profit and loss balance		
Debit balance Dec. 1, 1921 $22,017.54		
Dividends (7, 8 and 9) 120,000.00		
$142,017.54		
Net profit for year ending Nov. 30, 1921 51,723.94	$90,293.60	$1,241,909.40
		$1,299,445.75

Production amounted to 21,681 tons, yielding $460,186.37.

Wolverine Copper Mining Co.

A report of the operations of the Wolverine Copper Mining Co. for the year ended June 30, 1922, shows an operating loss of $46,142.10 according to the following account:

Sales		
3,386,972 lb. of copper at 13.187c		$446,626.51
Cost of sales		
Copper on hand July 1, 1921	$172,9 6.55	
Operating expenses at mine	463,542.14	
Smelting, freight and New York and Boston expenses	61,277.51	
Taxes	24,603.43	
	$722,379.63	
Less copper on hand June 30, 1922	230,303.25	
		492,076.38
Loss on sales of copper		$45,449.87
Add		
Interest paid	$2,237.98	
Less interest, etc. received	1,545.75	
		692.23
Operating loss for the year		$46,142.10

Balance sheet as of June 30, 1922, is given as follows:

ASSETS		
Investments		
Miscellaneous stocks and bonds, at cost		$95,154.73
Current assets		
Cash in bank and on hand	$22,602.37	
Accounts and bills receivable	209,660.00	
Copper on hand	230,303.25	
Supplies at mine	37,361.95	
Tax refund due	27,365.59	
		527,293.16
Unexpired insurance		1,578.50
		$624,026.39
Capital assets (book value)		
Real estate	181,819.23	
Mining property, cost	550,000.00	
Orebody enhancement as of March 1, 1913	1,943,718.50	
Buildings, machinery and plant	845,543.37	
Underground openings	575,353.22	
		$4,096,434.32
		$4,720,460.71
LIABILITIES		
Capital stock		
Paid in on 60,000 shares		$ 80,000.00
Current liabilities		
Accounts payable	$50,949.95	
Unclaimed dividends	4, 48.00	
		55,897.95
Unrealized appreciation	$523,366.37	
Reserve for depreciation	686,410.50	
Reserve for depletion	2,342,542.09	
		3,552,318.96
Suspense		27,365.59
Surplus and realized appreciation		
Balance, July 1, 1921	$446,876.42	
Add appreciation realized during the year	120,120.88	
	$566,997.30	
Deduct		
Operating loss for the year	$46,142.10	
Depreciation for the year	33,099.71	
Depletion for the year	166,750.08	
Loss on sale of Liberty Loan Bonds	16,127.20	
	$262,119.09	
Balance, June 30, 1922		$304,878.21
		$4,720,460.71

Production for the year amounted to 3,924,270 lb., at a cost of 19.093c. per lb., including depletion, depreciation, and taxes. Company produces copper in Michigan.

Mining Dividends for August, 1922

The following dividends were paid by mining and metallurgical companies in August, 1922:

Companies in the United States	Situation	Per Share	Total
Ahmeek Mining, c	Mich.	$1.00	$200,000
Calumet & Hecla, c	Mich.	1.25	125,000
Chief Consolidated, s.l.	Utah	0.10Q	88,402
Colorado Fuel & Iron pfd	Col., N. M., Wyo.	2.00Q	40,000
Columbus-Rexall, s.l.	Utah	0.03	17,567
General Development Co.	Various states	0.25Q	30,000
Homestake Mining, g.	S. D.	0.25M	62,790
International Nickel pfd	N. J., W. Va., Ont.	1.50Q	133,689
Isle Royale, c	Mich.	0.50	75,000
Miami Copper	Ariz.	0.50Q	373,557
New Cornelia Copper	Ariz.	0.25Q	450,000
New Jersey Zinc	Various states	2.00Q	909,328
Osceola Consolidated, c	Mich.	1.00	96,150
United Verde Extension, c	Ariz.	0.25Q	262,500
Companies in other countries			
Amparo Mining, g, s	Mexico	0.03Q	60,000
Hollinger Consolidated, g	Ont.	0.05 4 wks.	246,000
Lake Shore, g	Ont.	0.02	40,000
Lucky Tiger Comb., g.s.c.	Mexico	0.07	50,074
Rand Mines, g. (Amer. shares)	S. Africa	0.55	33,000

Q, quarterly; M, monthly; s, silver; g, gold; c, copper; l, lead.

The dividend list shows an encouraging increase over that of three months ago. Ahmeek resumed dividends for the first time since Sept. 30, 1920; Calumet & Hecla paid its last previous dividend on June 30, 1920; Isle Royale on Sept. 30, 1919; and Osceola Consolidated on June 30, 1920. These resumptions indicate that prosperity is returning to the Michigan copper companies. Chief Consolidated doubled its previous dividend, and the report showed the property to be in excellent condition. The Lucky Tiger Combination came back to 7c. after paying 10c. last month, and 7c. in June. The regular dividend is considered as 5c.

MINING STOCKS

Week Ended Aug. 26, 1922

Stock	Exch.	High	Low	Last		Last Div.
COPPER						
Ahmeek	Boston	64½	62	63½	Aug. '22, Q	$1.00
Alaska-Br. Col. new.	N. Y. Curb	2⅛	2⅛	2⅛	.....	....
Alloues	Boston	26	24½	24½	Mar. '19	1.00
Anaconda	New York	56½	54⅜	55¼	Nov. '20, Q	1.00
Arcadian Consol.	Boston	3⅜	3¼	3⅜	.....	....
Ariz. Com'l	Boston	9⅛	9	9⅛	Oct. '18, Q	0.50
Big Ledge	N. Y. Curb	*12	*9	*10	.....	....
Bingham Mines	Boston	†15	†14½	14½	Sept. '19, Q	0.25
Calumet & Arizona	Boston	62½	60½	61½	June '22, Q	0.50
Calumet & Hecla	Boston	301	296	300	Aug. '22, Q	5.00
Canada Copper	N. Y. Curb	*8	*6	*6	.....	....
Centennial	Boston	†10	†9	10	Dec. '18, SA	1.00
Cerro de Pasco	New York	41⅜	39½	40½	Mar. '21, Q	0.50
Chile Copper	New York	23½	22⅝	23¼	.....	....
Chino	New York	31½	30¼	31	Sept. '20, Q	0.37½
Con. Copper Mines	N. Y. Curb	....	....	*40	.....	....
Copper Range	Boston	44½	43½	44½	Mar. '22, Q	1.00
Crystal Copper	Boston Curb	1⅜	1⅜	1 11/16	.....	....
Davis-Daly	Boston	8	7⅜	7⅜	Mar. '20, Q	0.25
East Butte	Boston	11	10½	10½	Dec. '19, A	0.50
First National	Boston Curb	*65	*65	*65	Feb. '19, SA	0.15
Franklin	Boston	2¼	2	2¼	.....	....
Gadsden Copper	Boston Curb	*90	*81	*90	.....	....
Granby Consol.	New York	33⅜	32	32½	May '19, Q	1.25
Greene-Cananea	New York	33	32	32	Nov. '20, Q	0.50
Hancock	Boston	1½	1½	1½	.....	....
Howe Sound	N. Y. Curb	3½	3	3½	Jan. '21, Q	0.05
Inspiration Consol.	New York	42⅜	41	41½	Oct. '20, Q	1.00
Iron Cap	Boston Curb	†8	†6½	7½	Sept. '20, K	0.25
Isle Royale	Boston	24½	23	23	Aug. 22,	0.50
Kennecott	New York	38	36½	37½	Dec. '20, Q	0.50
Keweenaw	Boston	3	2⅞	2⅞	.....	....
Lake Copper	Boston	4⅜	4¼	4¼	.....	....
La Salle	Boston	†1⅜	†1¼	1⅜	.....	....
Magma Copper	N. Y. Curb	27¼	27	27	Jan. '19, Q	0.50
Majestic	Boston Curb	*8	*8	*8	.....	....
Mason Valley	N. Y. Curb	2½	1⅞	2⅛	.....	....
Mass. Consolidated	Boston	2⅛	2⅛	2⅛	Nov. '17, Q	1.00
Miami Copper	New York	30⅛	29½	30⅛	Aug. '22 Q	0.50
Michigan	Boston	3⅜	3	3⅛	.....	....
Mohawk	Boston	64	62½	64	July '22, Q	1.00
Mother Lode Coa.	N. Y. Curb	....	....	11	June '22, I	0.50
Nevada Consol.	New York	17⅛	17⅛	17⅛	Sept. '20, Q	0.25
New Cornelia	Boston	19⅛	18⅞	19	Aug. '22, F	0.25
North Butte	Boston	13⅜	12⅜	12⅜	Oct. '18, Q	0.25
Ohio Copper	N. Y. Curb	*10	*6	*10	.....	....
Old Dominion	Boston	26⅛	24½	25⅜	Dec. '18, Q	1.00
Osceola	Boston	38⅛	37½	38	Aug. '22, Q	1.00
Phelps Dodge	Open Mar.	†170	†160	....	July '22, Q	1.00
Quincy	Boston	44½	43½	43⅜	Mar. '20, Q	1.00
Ray Consolidated	New York	16⅜	16⅛	16⅛	Dec. '20, Q	0.25
Ray Hercules	N. Y. Curb	2⅛	1⅞	2⅛	.....	....
St. Mary's Min. Ld.	Boston	48	46	47	Apr. '22, K	2.00
Seneca Copper	Boston	12	12	12	.....	....
Shannon	Boston	*90	*90	* 90	Nov. '17, Q	0.25
Shattuck Arizona	New York	9⅛	8⅛	8⅛	Jan. '20, Q	0.25
South Lake	Boston	1	1	1	.....	....
Superior & Boston	Boston	1⅛	1⅛	1⅛	.....	....
Tenn. C. & C. cfs	New York	11⅛	10⅞	10⅝	May '18, I	1.00
Tuolumne	Boston	*70	*70	*70	May '13,	0.10
United Verde Ex.	Boston Curb	29	27	29	Aug. '22, Q	0.25
Utah Consol.	Boston	3	2⅛	2⅜	Sept. '18,	0.25
Utah Copper	New York	68⅞	66⅛	68⅛	June '22, Q	0.50
Utah Metal & T.	Boston	1⅜	1⅛	1⅛	Dec. '17,	0.30
Victoria	Boston	†2⅛	†1⅛	1⅜	.....	....
Winona	Boston	1⅛	1⅛	1⅛	.....	....
Wolverine	Boston	11⅛	11⅛	11⅛	.....	....
NICKEL-COPPER						
Internat. Nickel	New York	18⅛	17⅛	17¾	Mar. '19,	0.50
Internat. Nickel, pfd	New York	82	82	82	Aug. '22, Q	1.50
LEAD						
National Lead	New York	108½	102½	108½	June '22, Q	1.50
National Lead, pfd	New York	114⅞	114⅛	114⅞	June '22 Q.	1.75
St. Joseph Lead	New York	15¼	15⅛	15⅛	June '22, Q	0.25
QUICKSILVER						
New Idria	Boston	†*15	....	*15	.....	....
ZINC						
Am. Z. L. & S.	New York	18⅛	17⅜	18	May '20,	1.00
Am. Z. L. & S. pfd.	New York	48⅜	46½	47⅜	Nov. '20, Q	1.50
Butte C. & Z.	New York	7½	7	7	June '18,	0.50
Butte & Superior	New York	31¼	30	31⅛	Sept. '20,	1.25
Callahan Zn-Ld	New York	8⅜	8¼	8⅜	Dec. '20, Q	0.50
New Jersey Zn.	N. Y. Curb	153¾	147	152½	Aug. '22, Q	2.00
Yellow Pine	Los Angeles	....	....	*55	Sept. '20, Q	0.03

*Cents per share. †Bid or asked. Q, Quarterly. SA, Semi-annually. M Monthly. K, Irregular. I, Initial. X, Includes extra.

Toronto quotations courtesy Hamilton B. Wills; Spokane, Pohlman Investment Co; Salt Lake, Stock and Mining Exchange; Los Angeles, Chamber of Mines and Oil; Colorado Springs, The Financial Prese, N. Y.

Stock	Exch.	High	Low	Last		Last Div.
GOLD						
Alaska Gold	New York	⅛	⅛	⅛	.....	....
Alaska Juneau	New York	1¼	1¼	1¼	.....	....
Atlas	Toronto	*28½	*26½	*27½	.....	....
Carson Hill	Boston	10⅜	10	10	.....	....
Cresson Consol. G.	N. Y. Curb	2 13/16	2 11/16	2 11/16	July '22, Q,X	$0.10
Dome Mines	New York	39¼	35	37¼	July '22, Q	.50
Florence Goldfield	N. Y. Curb	*32	*15	*21	.....	....
Golden Cycle	Colo. Springs	....	....	*92	June '21, Q	0.02
Goldfield Consol.	N. Y. Curb	*9	*8	*8	Dec. '19,	0.05
Hollinger Consol.	Toronto	12	11¾	12	Aug. '22,	0.05
Homestake Mining	New York	70	70	70	Aug. '22, M	0.25
Kerr	Toronto	*13½	*12½	*13	.....	....
Kirkland Lake	Toronto	*47⅞	*45½	*47	.....	....
Lake Shore	Toronto	2.80	2.65	2.68	Aug. '22, Q	0.02
McIntyre-Porcupine	Toronto	20	19½	20	May '22, K	0.05
Porcupine Crown	Toronto	*23	*21½	*23	July '17,	0.03
Porcupine V. N. T.	Toronto	*18	*17	*18	.....	....
Portland	Colo. Springs	....	....	*39	Oct. '20, Q	0.01
Schumacher	Toronto	*76	*73	*74	.....	....
Silver Pick	N. Y. Curb	*12	*11	*11	.....	....
Teck Hughes	Toronto	*74	*73½	*73¾	.....	....
Tom Reed	Los Angeles	*78	*70	*72	Dec. '19,	0.02
United Eastern	N. Y. Curb	1⅜	1 5/16	1⅜	July '22, Q	0.15
Vindicator Consol.	Colo. Springs	....	....	*4	Jan. '20, Q	0.01
White Caps Mining	N. Y. Curb	*18	*13	*13	.....	....
Wright-Hargreaves	Toronto	3.30	3.12	3.25	July '22,	0.02½
Yukon Gold	N. Y. Curb	1	*98	*98	June '18,	0.02½
SILVER						
Batopilas Mining	New York	⅞	¾	¾	Dec. '07, I	0.12½
Beaver Consol.	Toronto	*35	*34	*34½	May '20, K	0.03
Coniagas	Toronto	1.35	1.35	1.35	May '21, Q	0.12½
Crown Reserve	Toronto	*23	*22½	*23	Jan. '17,	0.05
Kerr Lake	N. Y. Curb	3¼	3⅛	3¼	July '22, Q	0.12½
La Rose	Toronto	*29	*27	*27	Apr. '22,	0.10
McKinley-Dar.-Sav.	Toronto	*31	*30	*31	Oct. '20, Q	0.03
Mining Corp. Can.	Toronto	*90	*90	*90	Sept. '20, Q	0.12½
Nipissing	N. Y. Curb	6⅜	5⅞	6½	July '22, Q, X	0.30
Ontario Silver	New York	7	7	7	Jan. '19, Q	0.50
Ophir Silver	N. Y. Curb	....	....	*12	Jan. '12,	0.10
Temiskaming	Toronto	*38	*35	*38	Jan. '20, K	0.04
Trethewey	Toronto	*4	*3½	*4	Jan. '19,	0.05
GOLD AND SILVER						
Boston & Montana	N. Y. Curb	*17	*14	*16	.....	....
Cash Boy	N. Y. Curb	*9	*8	*9	.....	....
Dolores Esperanza	N. Y. Curb	2½	2	2	July '22,	2.50
El Salvador	N. Y. Curb	*15	*6	*14	.....	....
Jim Butler	N. Y. Curb	*7	*7	*7	Aug. '18, SA	0.07
Jumbo Extension	N. Y. Curb	*9	*6	*9	June '16,	0.05
MacNamara M.&M.	N. Y. Curb	*10	*8	*10	May '10,	0.02½
Tonopah Belmont	N. Y. Curb	1⅞	1⅝	1¾	July '22, Q	0.05
Tonopah Divide	N. Y. Curb	*72	*67	*71	.....	....
Tonopah Extension	N. Y. Curb	2 1/16	1 13/16	2 1/16	July '22, Q	0.05
Tonopah Mining	N. Y. Curb	2 1/16	2	2 1/16	Apr. '22, SA, X	0.07½
West End Consol.	N. Y. Curb	1⅛	1⅛	1 1/16	June '22, SA	0.05
SILVER-LEAD						
Caledonia	N. Y. Curb	*8	*8	*8	Jan. '21, M	0.01
Cardiff M. & M.	Salt Lake	....	....	*70	Dec. '20,	0.15
Chief Consol.	Boston Curb	5⅛	5⅛	5⅛	Aug. '22, Q	0.10
Columbus Rexall	Salt Lake	*26	*24	*24	Aug. '22,	0.03
Consol. M. & S.	Montreal	26⅞	25½	26½	Oct. '20, Q	0.62½
Daly Mining	Salt Lake	....	....	....	July '20, Q	0.10
Eagle & Blue Bell	Boston Curb	†3	†2½	2½	Apr. '21, K	0.05
Electric Point	Spokane	*4	*4	*4	May '20, SA	0.03
Federal M. & S.	New York	14⅛	14	14⅛	Jan. '09,	1.50
Federal M. & S. pfd.	New York	56⅛	53	53	June '22, Q	1.25
Florence Silver	Spokane	*35	*34	*34	Apr. '19,	0.01½
Grand Central	Salt Lake	....	....	*61	Jan. '21, K	0.01
Hecla Mining	N. Y. Curb	7⅛	6⅞	7⅛	June '22, Q	0.15
Iron Blossom Con.	N. Y. Curb	*33	*33	*33	Apr. '22, Q	0.02½
Judge M. & S.	Salt Lake	....	....	3.40	Sept. '20, Q	0.12½
Marsh Mines	N. Y. Curb	*17	*12	*16	June '21, I	0.02
Prince Consol.	Salt Lake	*9¾	*7¾	*9½	Nov. '17,	0.02½
Rambler-Cariboo	Spokane	*4	*4	*4	Feb. '19,	0.01
Rex Consol.	N. Y. Curb	*11	*9	*11	.....	....
Standard Silver-Ld.	N. Y. Curb	*19	*19	*19	Oct. '17,	0.05
Stewart Mines	N. Y. Curb	*8	*7	*8	Dec. '15,	0.05
Tamarack-Custer	Spokane	3.30	3.10	3.25	Jan. '21, K	0.04
Tintic Standard	Salt Lake	1.92½	1.90	1.92½	Dec. '21, Q	0.05
Utah Apex	Boston	3⅛	2⅞	3	Nov. '20, K	0.25
Wilbert Mining	N. Y. Curb	....	....	*7	Nov. '17,	0.01
VANADIUM						
Vanadium Corp.	New York	53¼	49¼	52	Jan. '21, Q	1.00
ASBESTOS						
Asbestos Corp.	Montreal	67	65	67	July '22, Q	1.50
Asbestos Corp. pfd.	Montreal	84	84	82	July '22, Q	1.75
SULPHUR						
Freeport Texas	New York	23⅜	21⅜	23	Nov. '19, Q	1.00
Texas Gulf	New York	51⅜	49½	50¼	June '22, QX	1.00
MINING, SMELTING AND REFINING						
Amer. Sm. & Ref.	New York	65⅜	62½	64	Mar. '21, Q	1.00
Amer. Sm.& Ref. pf.	New York	102½	100	102½	June '22 Q	1.75
Am. Sm. Sec. pf. A	New York	†100	†95	97	July '22, Q	1.50
U. S. Sm. R. & M.	New York	44	42½	44	Jan. '21, Q	0.50
U.S. Sm.R.& M. pf.	New York	48½	48½	48½	July '22, Q	.87½

NEW MACHINERY AND INVENTIONS

A Clamshell and Dragline Crawler Crane

PRELIMINARY TESTS have demonstrated that the several features embodied in the new Link-Belt crawler crane, manufactured by the Link-Belt Co., Chicago, Ill., offer an advantage in this type of a machine, the uses for which, in the mining field, will be many.

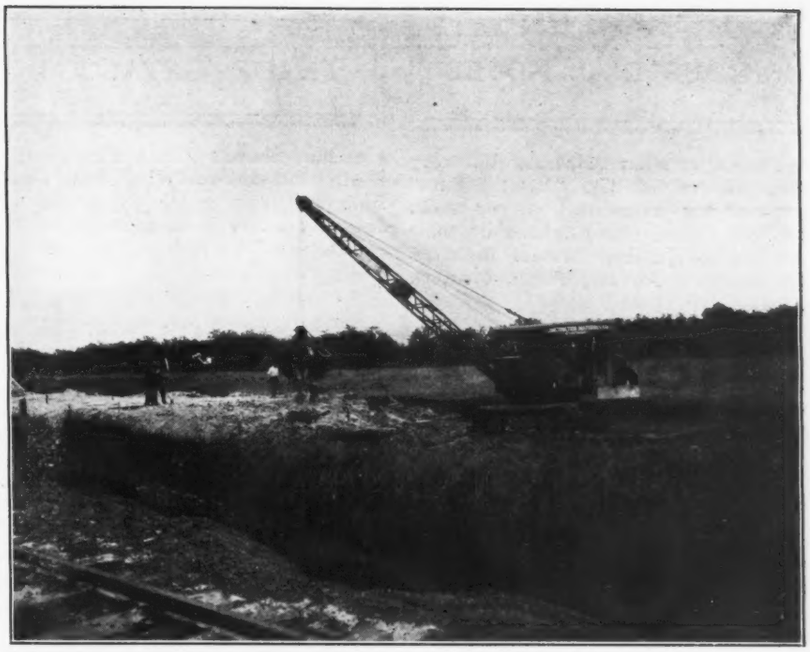
The new crawler crane weighs complete without bucket approximately 22 tons, making a ground pressure of 10 lb. per sq.in. It will safely lift 10 tons at 12-ft. radius, and 3 tons at 30-ft. radius. The hoisting speed is 125 ft. per minute, with a maximum rope pull of 10,000 lb. on a single line. Having two independent band-clutch-operated hoisting drums, the standard machine is suitable both for clamshell and dragline bucket work. The crane will rotate four complete revolutions per minute, travel three-quarters of a mile per hour, and climb a 20-per cent grade.

The lower frame is a single annealed open-hearth steel casting, designed with ample factor of safety to carry all the various severe diagonal stresses a machine of this character is undergoing. This construction insures absolute rigidity of the frame under all circumstances, doing away with all unnecessary friction caused from pinched shafts in bearings mounted on a more or less flexible structural frame.

The rear axle consists of a hollow cast-steel dead-axle housing, similar to automobile practice, on which the load-carrying sprockets are mounted, and inside of which are the floating drive axles, with cut bevel gearing, running in a bath of oil. The control clutch, steering the caterpillar, is also situated inside this housing. This clutch is in constant connection with a foot lever on the operator's platform, and can be used in any position of the rotating base. This foot lever also instantly locks the caterpillar, so that the crane can be operated on an incline without resorting to blocking. The cut bevel gearing underneath the frame connecting the vertical travel shaft with the longitudinal rear-axle counter shaft is also inclosed in a cast steel casing, the gears running in a bath of oil. This does away entirely with exposed gears in the lower frame and gives continuous automatic lubrication of gears and bearings, so that the operator is not required to crawl under the frame for the purpose of oiling.

The front axle is also an annealed steel casting provided with an easily operated take-up mechanism.

The rotation gear, roller path, and center casting form a single steel casting, which is larger than that of any other machine of this size on the market. This makes it possible to keep the center of gravity of the rotating frame within the roller race, even with the maximum and minimum operating loads, and thus greatly reduces the stresses in the center-pin and rotating mechanism.



Crawler crane for clamshell and dragline bucket work

The upper rotating frame is a single-piece annealed open-hearth steel casting. It rotates on four finished and bronze-bushed conical steel rollers, and is held together to the lower frame with a finished forged steel center-pin. The adjustment nuts for this center-pin can handily be reached from the deck of the rotating base.

With the exceptions of the slow running rotation gear and pinion, all gears, including spur, bevel and worm, have machined teeth cut from solid blanks of steel or bronze. There are only three bevel gears on the rotating frame, against a dozen or more in the usual type of crane, and there are only 16 gears of all descriptions, starting with the silent chain pinion and ending with the final gears in the ordinary locomotive crane.

Hoist and hold drums are 16 in. diameter, 12 in. face, each with 32 in. face expanding band clutch of the same constuction as the reversing friction clutches described above. The brake drums are mounted on extended hubs of their respective rope drums, connected to them by means of ratchet-and-pawl mechanism which enables the operator to set his brakes either before or while hoisting his load, so that the moment he pulls his hoist clutch out of engagement his load is instantly automatically held in position. This enables a less skilled operator to operate this crane successfully, as it requires a certain amount of dexterity to manipulate clutch and brakes simultaneously. It also increases materially the speed with which grab bucket work can be done.

The boom is 35 ft. long and is made of angle and lattice bar construction, parabolic shape, which is much stronger, weight for weight, than the channel boom ordinarily used on this type of machine.

A Pipe Wrench Which Embodies New Features

An "end-opening" feature, which is familiar to users of machinists' wrenches, the ease with which it can handle pipes in corners, close to walls, and similar confined places, and the simplicity of parts, are interesting improvements embodied in a new pipe wrench, known as the "Little Giant" and manufactured by the Greenfield Tap & Die Corporation, Greenfield, Mass.

Three parts comprise this wrench: a handle and jaw in one piece, which is drop-forged and heat-treated; a movable jaw, likewise drop-forged and heat-treated, and a hardened steel nut. There are no springs, rivets, frame, or pins, all these parts being eliminated. In spite of the absence of springs the wrench takes hold and releases instantly at the option of the user.

Another feature is the double set of teeth on the main jaw. The movable jaw can be engaged at the option of the operator with either of these sets of teeth, with consequent lengthened life. On the large sizes, 14 in. and greater, two additional sets of teeth are provided, making four in all, and the movable jaw can be reversed to engage these additional sets of teeth, which are below the adjusting nut. This is very useful in connection with certain classes of work, besides practically quadrupling the life of the tool.

The "Little Giant" wrench is being manufactured in 8-, 10-, 14-, 18-, and 24-in. sizes, of which the three smaller sizes are already on the market.

INDUSTRIAL NOTES

The Australian Minerals Recovery Co., owners of the "Nevill-Soanes" process for extracting copper from oxidized ores, have changed their address to National Mutual Building, St. George's Terrace, Perth, Western Australia.

Effective Sept. 1 the smokeless powder division of the E. I. du Pont de Nemours & Co. will be separated from the explosives department and will be operated as an independent industrial department, known as the Smokeless Powder Department, under the guidance of A. Felix du Pont, vice-president and general manager. Mr. du Pont has been the assistant general manager in charge of the smokeless powder division since September, 1921.

A decision of importance and wide interest was handed down on July 26 by Judge Augustus N. Hand, of the United States District Court for the Southern District of New York, in a case involving the right of a German corporation to continue its business in the United States where its American property had been seized and sold by the Alien Property Custodian during the war. In the suit in question the purchaser of the American property and good will of the Orenstein & Koppel A. G. of Berlin (formerly known as Orenstein-Arthur Koppel Co., including its plant located at Koppel, near Pittsburgh, attempted by injunction to prevent the German corporation from again doing business in this country. In addition to its plant at Koppel, Pa., the Orenstein & Koppel A. G. has numerous plants in Germany and in other countries for the manufacture of industrial railway equipment, and it is the largest concern in the world of this kind. After the war, the German corporation opened an office in New York in the name of L. E. Hellmann at 50 Church St. Eric Joseph, who before the war was in charge of the entire American business, is now in charge of the New York office and was a defendant in the suit. Judge Hand held that the sale by the Alien Property Custodian to the complainant of the American good will of the German corporation did not terminate or affect the right of the German corporation to do business in the United States in its own name and to solicit business among its former customers in this country. It was further held that the attempt of the complainant company to prevent the German corporation from doing business here in its own name, because the deed from the Alien Property Custodian of the tangible assets also purported to convey the good will of the corporation, was something which was neither covered in terms by the war legislation of Congress nor justified under any sound legal theory.

TRADE CATALOGS

Steam Shovels—The Bucyrus Co., South Milwaukee, Wis., has issued Bulletin C-201, which illustrates and describes a new ¾-cu.yd. 20-ton revolving shovel. This type was described in the *Journal-Press* of July 22, 1922, under "New Machinery and Inventions."

Earth Handling Machinery—Western Wheeled Scraper Co., Aurora, Ill. have recently issued catalog No. 53 which illustrates and describes Western equipment in mill, pit and quarry work. This equipment covers plows, drag and wheeled scrapers, dump wagons and cars. Installations in cement, limestone, gravel and clay operations are detailed.

Transportation — The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has just issued a sixty-four-page catalog, known as 6-M, which illustrates and describes line material for mines. A complete list of such apparatus as babbitts, bonds, clamps, insulators, and slicers is given, and, in addition, the publication contains information concerning mine safety switches, Frankel solderless connectors, tapes, babbitts, solders, micarta gears, mine locomotives, and mine-locomotive headlights.

Compressors—A new steam-driven air compressor, modeled after an angle compound design, which has heretofore been belt driven or direct connected only, is described in a recent bulletin issued by the Sullivan Machinery Co., Chicago, Ill. It is believed by the manufacturers that the combination of a high-economy modern steam engine with the angle compound compressor will provide unusually good steam-driven compressor features. Present capacities of the machine range from 1,000 to 3,500 ft. of free air per minute.

Flotation Oils and Reagents—The Barrett Co., New York and Salt Lake City, have recently issued a 16-p. booklet "Flotation Oils and Reagents," the purpose of which is to show the various methods of ore testing with flotation oil and reagents. The booklet also describes the various difficulties encountered in making laboratory tests and general experimental work. The following opening paragraph is of interest: "One of the most vital factors on which the successful operation of a flotation plant depends, is the oils. If, for any reason, the correct oils are not being employed to meet the conditions under which they are being used, unsatisfactory results are bound to be obtained. Many adjustments and slight changes in operation can be made to take care of many of the minor troubles that are encountered from time to time in the plant. Unfortunately, however, such procedure will not correct unsatisfactory results that are caused by the use of incorrect or inferior oils."

CONSTRUCTION NEWS

Details of New $500,000 Shaft and Mine Plant on the Gogebic Iron Range

Details of the new shaft to be sunk at the Royal mine on the Gogebic Range in Michigan by the Oliver Iron Mining Co. have been announced. The outside dimensions of the shaft are to be 11 x 25 ft., and the steel sets are to be built of extra heavy "H" sections with flanges and webs not less than ¾ in. thick. This extra thickness is to provide against deterioration due to corrosion, over a long period of years. It is almost impossible to apply paint thoroughly after the steel sets are in place, and there are objections to covering with concrete or gunite. Where necessary the shaft is to be "lathed" with reinforced concrete plank, as has been common practice in the district for several years. As the shaft will be sunk entirely in the granite, a large part of it should not require lathing.

The sinking equipment to be used will consist of two 150-hp. electric-driven double-drum hoists and two electric-driven 550-cu.ft. air compressors. A temporary wood headframe has been erected. The permanent buildings are to be built of concrete blocks which the company had left over from its construction work at the Norrie-Aurora group of mines. They are of "T" shape, form a rigid hollow wall, and give good insulation. The roofs will have steel trusses covered with concrete.

The hoists planned conform to the general design adopted by the company in twelve other hoists built in the last few years, but they are larger, being designed to work to a depth of 4,000 ft. instead of 3,000 ft. The skip hoist is to have a single cylindrical 12 ft. drum with a 17 ft. 6 in. face grooved for 1¾ in. rope to handle ten-ton skips. The drive is from a 1,500-hp. induction motor through herringbone gears to give a hoisting speed of 1,500 ft. per minute. The cage hoist is to be of similar construction with drum 12 ft. x 13 ft. 6 in., grooved for 1⅜ in. rope, and driven by a 400-hp. motor with a rope speed of 1,000 ft. per minute. Two 2,300-ft. electric-driven air compressors are also to be installed in the engine house. The company has been trying out several types of compressors at its other Michigan properties and has not yet announced the type to be used here. Valve breakage has been a serious trouble with some of the newer types of compressors.

Erection of Cortez Mill Begun

Grading for the 100-ton mill of the Consolidated Cortez Mining Co. at Cortez, Nev., has been started. The process will be a combination of table concentration and cyanidation. Power for mine and mill will be furnished by semi-Diesel gas engines.